

1 CHAPTER 1

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GLOSSARY OF ABBREVIATIONS, ACRONYMS, AND DEFINITIONS

30 SW/SEO - 30th Space Wing, Mission Flight Control

30 SW/SEY - 30th Space Wing, Flight Analysis

45 SW/SEO - 45th Space Wing, Mission Flight Control and Analysis

45 SW/SEOE - 45th Space Wing, Expendable Launch Vehicle Operations Support and Analysis

45 SW/SEO - 45th Space Wing, Mission Flight Control

45 SW/SEOS - 45th Space Wing, Space Transportation System Operations Support and Analysis

45 and 30 LG - 45th and 30th Logistics Group

45 and 30 MDG - 45th and 30th Medical Group

45 and 30 OG - 45th and 30th Operations Group

45 and 30 SPTG - 45th and 30th Support Group

45 and 30 SW/SE - 45th and 30th Space Wing, Office of the Chief of Safety; *see also Office of the Chief of Safety*

45 and 30 SW/SEG - 45th and 30th Space Wing, Ground Safety

45 and 30 SW/SES - 45th and 30th Space Wing, Systems Safety

approval - Range Safety approval is the final approval necessary for data packages such as the Preliminary Flight Data Package, the Final Flight Data Package, the Missile System Prelaunch Safety Package, the Range Safety System Report, the Ground Operations Plan, and the Facility Safety Data Package. In addition, Range Safety approval is required for hazardous and safety critical procedures prior to the procedure being performed; however, Range Safety approval does not constitute final approval for hazardous and safety critical procedures since Range Users normally have additional approval requirements prior to the procedure being performed.

AF - Air Force

AFETR - Air Force Eastern Test Range

AFI - Air Force Instruction

BDA - Blast Danger Area

Blast Danger Area - a hazardous clear area; clearance prior to establishment of a major explosive hazard such as vehicle fuel/oxidizer load and pressurization; the area subject to fragment and direct overpressure resulting from the explosion of the booster/payload

CAL-OSHA - California Occupational Safety and Health Act

CCAS - Cape Canaveral Air Station

cDR - Conceptual Design Review

CDR - Critical Design Review; Command Destruct Receiver

CFR - Code of Federal Regulations

COLA - Collision Avoidance

collective risk - the total risk to an exposed population; the expected (average, mean) number of individuals who will be casualties

commercial user - a non-federal government organization that provides launch operations services

Control Area Clears - a hazardous clear area; clearance of defined areas to protect personnel from hazardous operations

control authority - a single commercial user on-site director and/or manager, a full time government tenant director and/or commander, or United States Air Force squadron/detachment commander responsible for the implementation of launch complex safety requirements

deviation - a designation used when a design non-compliance is known to exist prior to hardware production or an operational noncompliance is known to exist prior to beginning operations at CCAS and Vandenberg Air Force Base

DDESB - Department of Defense Explosive Safety Board

DEP - Directed Energy Plan

DoD - Department of Defense

DoDD - Department of Defense Directive

DOT - Department of Transportation

GLOSSARY OF ABBREVIATIONS, ACRONYMS, AND DEFINITIONS

ECP - Engineering Change Proposal

ER - Eastern Range

ERR - Eastern Range Regulation

ESMCR - Eastern Space and Missile Center Regulation

errant launch vehicle - a launch vehicle that, during flight, violates established flight safety criteria and/or operates erratically in a manner inconsistent with its intended flight performance. Continued flight of an errant launch vehicle may grossly deviate from planned flight, with the possibility of increasing public risk to unacceptable limits.

explosive warhead launch approval - the mandatory prior written approval given by the Eastern or Western Range Commanders to Range Users who launch launch vehicles carrying explosive warheads

explosive quantity distance site plans - a formal plan for explosives facilities and areas required in accordance with AFM 91-201 and DoD 6055.9-STD detailing explosives quantity operating and storage limits and restrictions and resultant distance clearance requirements

FCA - Flight Caution Area

FDR - Final Design Review

FFDP - Final Flight Data Package

FFPA - Final Flight Plan Approval

Flight Caution Area - a Hazardous Launch Area; the controlled surface area and airspace outside the Flight Hazard Area (FHA) where individual risk from a launch vehicle malfunction during the early phase of flight exceeds 1×10^{-6} . When activated, only personnel essential to the launch operation (mission-essential) with adequate breathing protection are permitted in this area; *see also Flight Hazard Area, mission-essential personnel*

FHA - Flight Hazard Area

Flight Hazard Area - a Hazardous Launch Area; the controlled surface area and airspace about the launch pad and flight azimuth where individual risk from a malfunction during the early phase of flight exceeds 1×10^{-5} . Because the risk of serious injury or death from blast overpressure or debris is so significant, only mission-essential personnel in ap-

proved blast-hardened structures with adequate breathing protection are permitted in this area during launch.

FSDP - Facility Safety Data Package

FTS - Flight Termination System

GOP - Ground Operations Plan

GPS - Global Positioning System

h - hour, hours

Hazardous Clear Areas - Safety Clearance Zones for ground processing that are defined in the Operations Safety Plans for each operating facility; include BDA, Control Area Clears, and Toxic Hazard Corridor

Hazardous Launch Area Clearance - required clearances; concurrence from the Chief of Safety must be obtained for all personnel required or requesting to be in a Hazardous Launch Area during a launch operation; mission-essential personnel may be permitted within the Impact Limit Lines and the FCA, but only within the FHA if located in approved blast-hardened structures with adequate breathing apparatus; Wing-essential personnel located at required work areas and non-essential personnel may be permitted inside the impact limit lines with Wing Commander approval; *see also FCA, FHA, impact limit lines, mission-essential personnel*

Hazardous Launch Areas - Safety Clearance Zones during launch operations, including the FCA, FHA, Vessel Exclusion Area, and impact limit lines

HCA - Hazardous Clear Areas

HLA - Hazardous Launch Areas

HPWT - High Performance Work Team

ILL - impact limit line

imminent danger - any condition, operation, or situation that occurs on the Range where a danger exists that could reasonably be expected to cause death or serious physical harm, immediately or before the imminence of such danger can be eliminated through control procedures; these situations also include health hazards where it is reasonably expected that exposure to a toxic substance or

GLOSSARY OF ABBREVIATIONS, ACRONYMS, AND DEFINITIONS

other hazard will occur that will cause harm to such a degree as to shorten life or cause a substantial reduction in physical or mental efficiency even though the resulting harm may not manifest itself immediately

impact limit line - a Hazardous Launch Area; the boundary within which trajectory constraints and FTSs are used to contain an errant launch vehicle and vehicle debris. Mission-essential and Wing-essential personnel are permitted within the ILLs; with Wing Commander approval, non-essential personnel may be permitted within this area. However, the collective risk will not exceed acceptable standards for non-essential personnel; *see also mission-essential personnel, non-essential personnel*

individual risk - the risk to a randomly exposed individual; the probability that the individual will be a casualty

ISP - Intended Support Plan

KMR - Kwajalein Missile Range

KSC - Kennedy Space Center

launch area safety - safety requirements involving risks limited to personnel and/or property on CCAS and may be extended to KSC or VAFB; involves multiple commercial users, government tenants, or United State Air Force squadron commanders

launch area - the facility, in this case, CCAS and KSC or Vandenberg Air Force Base, where launch vehicles and payloads are launched; includes any supporting sites on the Eastern or Western Range; also known as launch head

launch complex - a defined area that supports launch vehicle or payload operations or storage; includes launch pads and/or associated facilities

launch complex safety - safety requirements involving risk that is limited to personnel and/or property located within the well defined confines of a launch complex, facility, or group of facilities; for example, within the fence line; involves risk only to those personnel and/or property under the control of the control authority for the launch complex, facility, or group of facilities

launch head - *see launch area*

launch vehicle - a vehicle that carries and/or delivers a payload to a desired location; this is a generic term that applies to all vehicles that may be launched from the Eastern and Western Ranges, including but not limited to airplanes; all types of space launch vehicles, manned space vehicles, missiles, and rockets and their stages; probes; aerostats and balloons; drones; remotely piloted vehicles; projectiles, torpedoes and air-dropped bodies

lead time - the time between the beginning of a process or project and the appearance of its results

LDCG - Launch Disaster Control Group; ER and WR teams responsible for responding to launch emergencies

LRR - Launch Readiness Review

MIC - meets intent certification; a noncompliance designation used to indicate that an equivalent level of safety is maintained despite not meeting the exact requirements stated in this Regulation

MIL-SPEC - military specification

MIL-STD - military standard

mission-essential personnel - those persons necessary to successfully and safely complete a hazardous or launch operation and whose absence would jeopardize the completion of the operation; includes persons required to perform emergency actions according to authorized directives, persons specifically authorized by the Wing Commander to perform scheduled activities, and person in training; the number of mission-essential personnel allowed within Safety Clearance Zones or Hazardous Launch Areas is determined by the Wing Commander and the Range User with Range Safety concurrence

MSPSP - Missile System Prelaunch Safety Package

NASA - National Aeronautics and Space Administration

NASC - National Aeronautics and Space Council

NAWC - Naval Air Warfare Center

NSC - National Security Council

noncompliance - a noticeable or marked departure from Regulation standards or procedures; includes

GLOSSARY OF ABBREVIATIONS, ACRONYMS, AND DEFINITIONS

deviations, meets intent certifications, and waivers

non-essential personnel - those persons not deemed mission-essential or Wing-essential; includes the general public, visitors, the media, and any persons who can be excluded from Safety Clearance Zones with no effect on the operation or parallel operations

O&SHA - Operating and Support Hazard Analysis

OSHA - Occupational Safety and Health Act

Office of the Chief of Safety - the Range office headed by the Chief of Safety; this office ensures that the Range Safety Program meets Range and Range User needs and does not impose undue or overly restrictive requirements on a program

OCST - Office of Commercial Space Transportation, DOT

PAFB - Patrick Air Force Base located in Florida

PMRF - Pacific Missile Range Facility

payload - the object(s) within a payload fairing carried or delivered by a launch vehicle to a desired location or orbit; a generic term that applies to all payloads that may be delivered to or from the Eastern or Western Ranges; includes but is not limited to satellites, other spacecraft, experimental packages, bomb loads, warheads, reentry vehicles, dummy loads, cargo, and any motors attached to them in the payload fairing

PD - presidential directive

PDR - Preliminary Design Review

PFDP - Preliminary Flight Data Package

PHA - Preliminary Hazard Analysis

PL - public law

program - the coordinated group of tasks associated with the concept, design, manufacture, preparation, checkout, and launch of a launch vehicle and/or payload to or from, or otherwise supported by the Eastern or Western Ranges and the associated ground support equipment and facilities

PTR - Program Trouble Report

public safety - safety involving risks to the general public of the United States or foreign countries

and/or their property

radioactive material launch approval - approval granted by Range Safety to Range Users intending to launch radioactive materials

Range Commander - Commander of the Eastern and Western Range in accordance with DoDD 3200.11; sometimes called *Range Director*, when interfacing with commercial Range Users.

NOTE: Currently, the 45 SW and 30 SW Commanders are also the Range Commanders and Range Directors

Range Safety Launch Commit Criteria - hazardous or safety critical parameters, including, but not limited to, those associated with the launch vehicle, payload, ground support equipment, Range Safety System, hazardous area clearance requirements, and meteorological conditions that must be within defined limits to ensure that public, launch area, and launch complex safety can be maintained during a launch operation

Range Safety Program - a program implemented to ensure that launch and flight of launch vehicles and payloads present no greater risk to the general public than that imposed by the overflight of conventional aircraft; such a program also includes launch complex and launch area safety and protection of national resources

Range Safety System - the system consisting of the airborne and ground flight termination systems, airborne and ground tracking system, and the airborne and ground telemetry data transmission systems

Range Users - clients of the Cape Canaveral Air Station and Vandenberg Air Force Base, such as the Department of Defense, non-Department of Defense US government agencies, civilian commercial companies, and foreign government agencies that use Eastern or Western Range facilities and test equipment; conduct prelaunch, launch, and impact operations; or require on-orbit support

GLOSSARY OF ABBREVIATIONS, ACRONYMS, AND DEFINITIONS

Ranges - in this document, *Ranges* refers to the Eastern Range at CCAS, KSC, and PAFB, and the Western Range at Vandenberg Air Force Base

risk - a measure that takes into consideration both the probability of occurrence and the consequence of a hazard to a population or installation. Risk is measured in the same units as the consequence such as number of injuries, fatalities, or dollar loss. For Range Safety, risk is expressed as casualty expectation or shown in a risk profile; *see also collective risk and individual risk.*

risk analysis - a study of potential risk

risk-cost benefit concept - the concept used to determine the granting of waivers, deviations, or meets intent certifications to Eastern and Western Range 127-1 requirements by comparing the costs, risks, and benefits of the mission. If the application of an EWR 127-1 requirement results in a significant reduction of risk at an acceptable level of cost, it may be judged by Range Safety to be sufficient to impose a requirement; however, if the benefit is insignificant and/or the cost is high, the requirement may be deviated from, waived, or determined to meet the intent, all with consideration to public safety. The risk of concern may be the mean or average risk, or it may be a risk corresponding to a high consequence at a low probability (a catastrophic risk). The assurance of a very low probability may be required for a very high consequence even if a high cost may be entailed.

RSBBS - Range Safety Bulletin Board System

RSLCC - Range Safety Launch Commit Criteria

RSSR - Airborne Range Safety System Report

RTS - Range Tracking System

safety holds - the holdfire capability, emergency voice procedures, or light indication system of each launch system used to prevent launches in the event of loss of Range Safety critical systems or violations of mandatory Range Safety launch commit criteria

Safety Clearance Zones - restricted areas designated for day-to-day prelaunch processing and launch operations to protect the public, launch area, and launch complex personnel; these zones

are established for each launch vehicle and payload at specific processing facilities, including launch complexes; includes HCA and HLA

safety margins (destruct) - margins used to avoid overly restrictive flight termination limits; normally based on launch vehicle three-sigma performance characteristics

SCN - Specification Change Notice

SHA - System Hazard Analysis

space safety professional - a safety professional who has been trained and formally certified to meet the criteria outlined in the Launch Complex Safety Training and Certification Program Document

SPR - Software Problem Report

SSHA - Subsystem Hazard Analysis

SSPP - System Safety Program Plan

STR - Software Trouble Report

STS - Space Transportation System

SWI - space wing instruction

TDTS - Telemetry Data Transmitting System

THC - Toxic Hazard Corridor

TIM - Technical Interchange Meeting

Toxic Hazard Corridor - a Hazardous Clear Area; clearance of a sector in which toxic material may reach predetermined concentration levels

TPS - Telemetry Processing Station

US - United States

USAF - United States Air Force

USC - United States Code

VEA - Vessel Exclusion Area

Vessel Exclusion Area - a combination of the sea surface area and airspace measured from the launch point and extending downrange along the intended flight azimuth; the size of the VEA is based on hazard containment or a combination of acceptable impact probability and personnel risk

WCOOA - West Coast Offshore Operating Area

waiver - a designation used when, through an error

GLOSSARY OF ABBREVIATIONS, ACRONYMS, AND DEFINITIONS

in the manufacturing process or for other reasons, a hardware noncompliance is discovered after hardware production, or an operational noncompliance is discovered after operations have begun at the Eastern or Western Range

Wing Commander - *see Range Commander*

WSMCR Western Space and Missile Center Regulation

VAFB - Vandenberg Air Force Base; located in California

WR - Western Range

WRR - Western Range Regulation

REFERENCED DOCUMENTS

29 CFR 1910.119, *Process Safety Management of Highly Hazardous Chemicals*

40 CFR 355, *Emergency Planning and Notification*

45 SWI 99-101, 45th Space Wing Mission Program Documents

AFI 91-204, *Safety Investigations and Reports*

AFI 91-110, *Nuclear Safety Review and Launch Approval for Space or Missile Use of Radioactive Material and Nuclear Systems*

AFI 99-101, *Developmental Test and Evaluation*

AFI 99-102, *Operational Test and Evaluation*

AFI 99-113, *Space Systems Test and Evaluation Process Direction and Methodology for Space Systems Testing*

AFMAN 91-201, *Explosive Safety Standards*

AFMAN 99-110, *Airframe Propulsion-Avionics Test and Evaluation Process*

CERCLA, *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*

Department of Defense Directive 3200.11, *Major Range and Test Facility Base*

Department of Defense Directive 3230.3, *DoD Support for Commercial Space Launch Activities*

DoD 6055.9-STD, *DoD Ammunition and Explosives Safety Standards*

DOT OCST 14 CFR, Chapter III, "Commercial Space Transportation; Licensing Process for Commercial Space Launch Activities"

Executive Order 12856, "Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements"

MIL-STD-498, *Software Development and Documentation*

National Aeronautics and Space Council, *Nuclear Safety Review and Approval Procedures for Minor Radioactive Sources in Space Operations*

Presidential Directive/National Security Council 25, *Scientific or Technological Experiments with Possible Large-Scale Adverse Environmental Effects and Launch of Nuclear Systems into Space*

Public Law 10, 10 USC Section 172, *Ammunition Storage Board*

Public Law 91-596, 29 USC 651-678, *Occupational Health and Safety Act*

Public Law 60, 81st Congress, 1st Session, *Guided Missiles Joint Long Range Proving Ground*

Public Law 98-575, 49 USC 2601-2623, *The Commercial Space Launch Act of 1984, As Amended*

Public Law 99-499, 42 USC 11001-11050, *Superfund Amendments and Reauthorization Act (SARA), Title III: Emergency Planning and Community Right-to-Know Act (EPCRA)*

CHAPTER 1

EASTERN AND WESTERN RANGE

SAFETY POLICIES AND PROCESSES

1.1 INTRODUCTION

1.1.1 Purpose of the Chapter

Chapter 1 describes the Range Safety Program; defines responsibilities and authorities; and delineates policies, processes, and approvals for all activities from design concept through test, checkout, assembly, and launch of launch vehicles and payloads to orbital insertion or impact from or onto the Eastern Range (ER) or Western Range (WR). The following major topics are addressed:

- 1.2 Range Safety Program
- 1.3 Responsibilities and Authorities
- 1.4 Range Safety Policy
- 1.5 Safety Authorizations, Compliances, and Documentation
- 1.6 Range Safety and Range User Interface Process
- 1.7 Range Safety "Concept to Launch" Process
- 1.8 Changes to Approved Generic Systems
- 1.9 Changes to the Document
- 1.10 Investigating and Reporting Mishaps and Incidents
- 1.11 Range Safety Range User Handbook
- 1.12 Range Safety Bulletin Board System

1.1.2 Applicability

The policies, requirements, processes, procedures, and approvals defined in this Chapter and the other chapters in this document are applicable to all organizations, agencies, companies, and programs conducting or supporting operations on the ER and WR. **NOTE:** When used in this document, the

terms *Range* or *Ranges* refer to both the Eastern Range and the Western Range.

1.1.2.1 The Eastern and Western Ranges

1.1.2.1.1 The Eastern Range.

a. The ER is the launch head at Cape Canaveral Air Station (CCAS); owned or leased facilities on downrange sites such as Antigua and Ascension; and in the context of launch operations, the Atlantic Ocean, including all surrounding land, sea, and air space within the reach of any launch vehicle extending eastward into the Indian and Pacific Oceans. Figure 1-1 shows the typical launch sector for launches from the ER; Figure 1-2 shows owned or leased facilities on sites downrange from the ER.

b. Range management activities are concentrated at Patrick Air Force Base (PAFB), Florida.

c. Launch vehicle and payload prelaunch and launch activities are concentrated at CCAS, Kennedy Space Center (KSC), and miscellaneous outlying support locations.

d. Launch activities conducted by ER personnel operating outside the geographical limits described above may occur under Department of Defense (DoD) or United States Air Force (USAF) direction or under the auspices of agreements made by those agencies. In such cases, the term *Eastern Range* or *ER* is expanded to include these situations and apply, as required, for the specific mission, launch, launch area, and impact area.

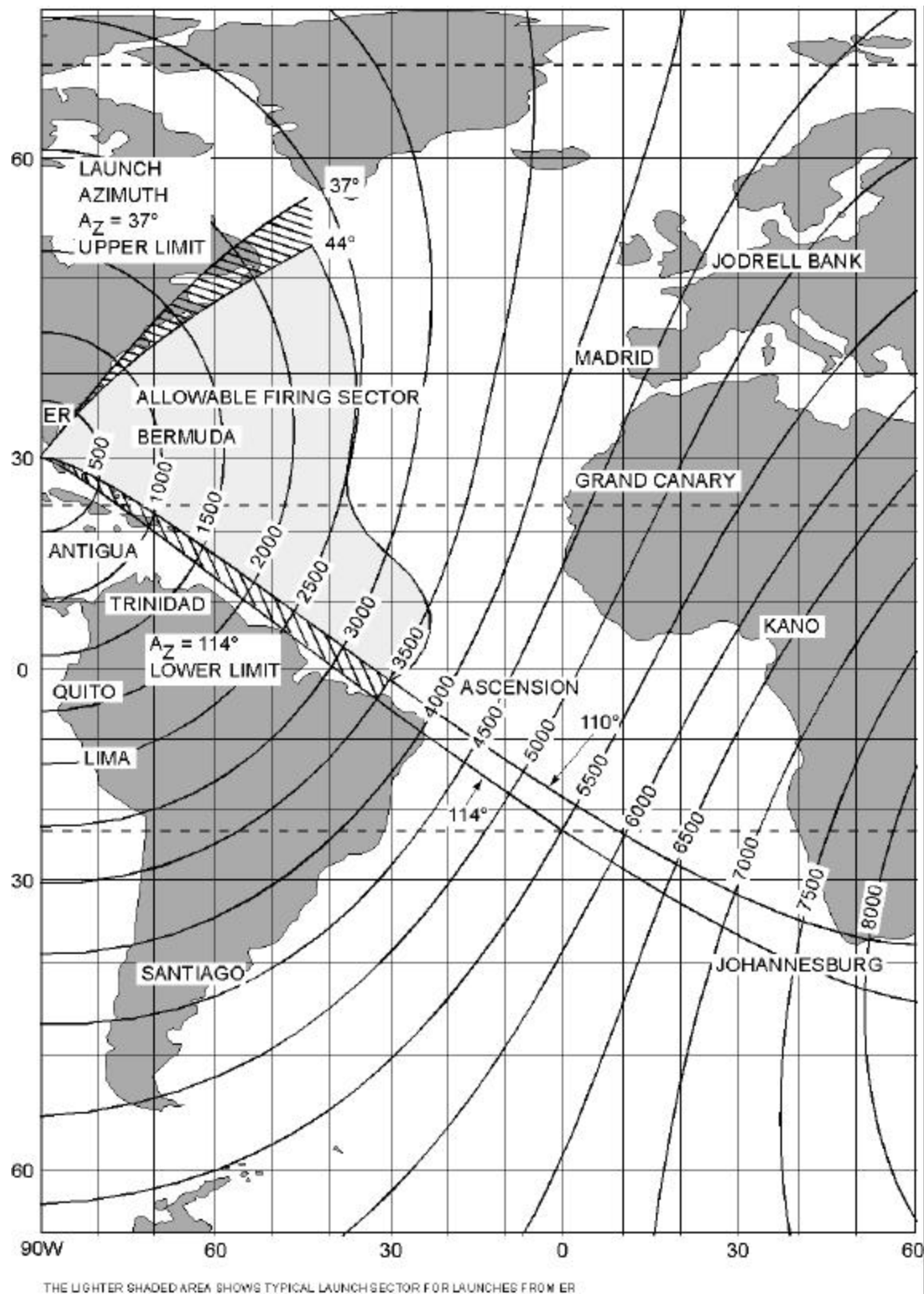


Figure 1-1
Typical Launch Sector for Launches From the Eastern Range

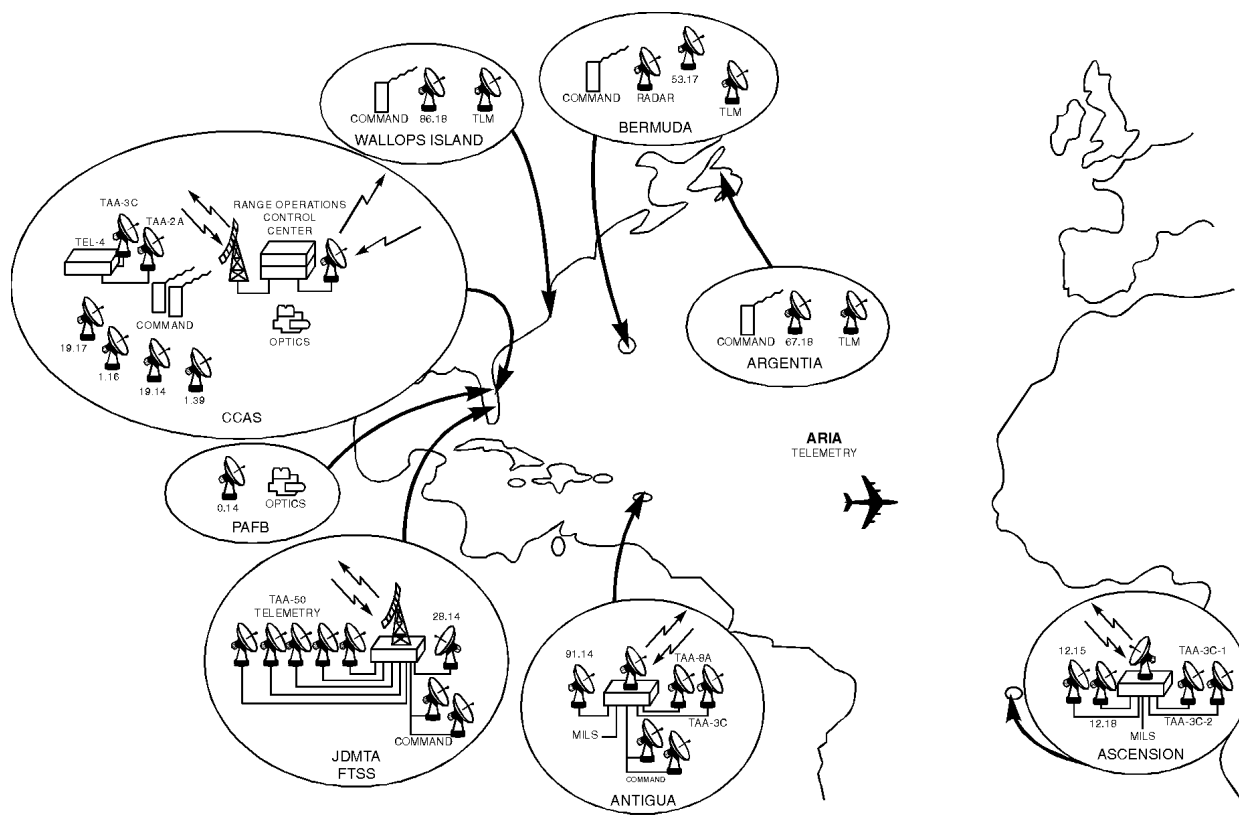


Figure 1-2
Owned or Leased Facilities on Sites Downrange from the Eastern Range

1.1.2.1.2 The Western Range.

a. The WR is the launch head at Vandenberg Air Force Base (VAFB) and extends along the West Coast of the continental United States (US) westward through the Pacific and Indian Oceans. Figure 1-3 shows the typical launch sector for launches from the WR; Figure 1-4 shows owned or leased facilities on sites uprange along the Pacific Coast, including US Navy facilities at Point Mugu, and downrange from the WR.

b. Range management activities as well as launch and prelaunch processing activities are concentrated at VAFB in California.

c. Launch activities conducted by WR personnel operating outside the geographical limits described above may occur under DoD or USAF direction or under the auspices of agreements made by those agencies. In such cases, the term *Western Range* or *WR* is expanded to include these situations and apply, as required, to the specific mission, launch, launch area, and impact area.

1.1.2.1.3 Eastern and Western Range Differences. The ER and WR have some differences in their Range Safety requirements. These differences are caused by geographical differences that change risk levels for launch operations, organizational variations, and different Range User requirements such as those associated with manned space flights at the ER and ballistic launches into the Kwajalein Atoll and aircraft tests at the WR. At present, where a requirement differs, the Range User may standardize to the more stringent requirement or meet the requirements of each Range, whichever option is technically or economically more desirable. Specific ER and WR differences are noted throughout this document.

1.1.2.2 Range Users

Range Users include the DoD, non-DoD US government agencies, civilian commercial companies, and foreign government agencies that use ER and WR facilities and test equipment; conduct prelaunch,

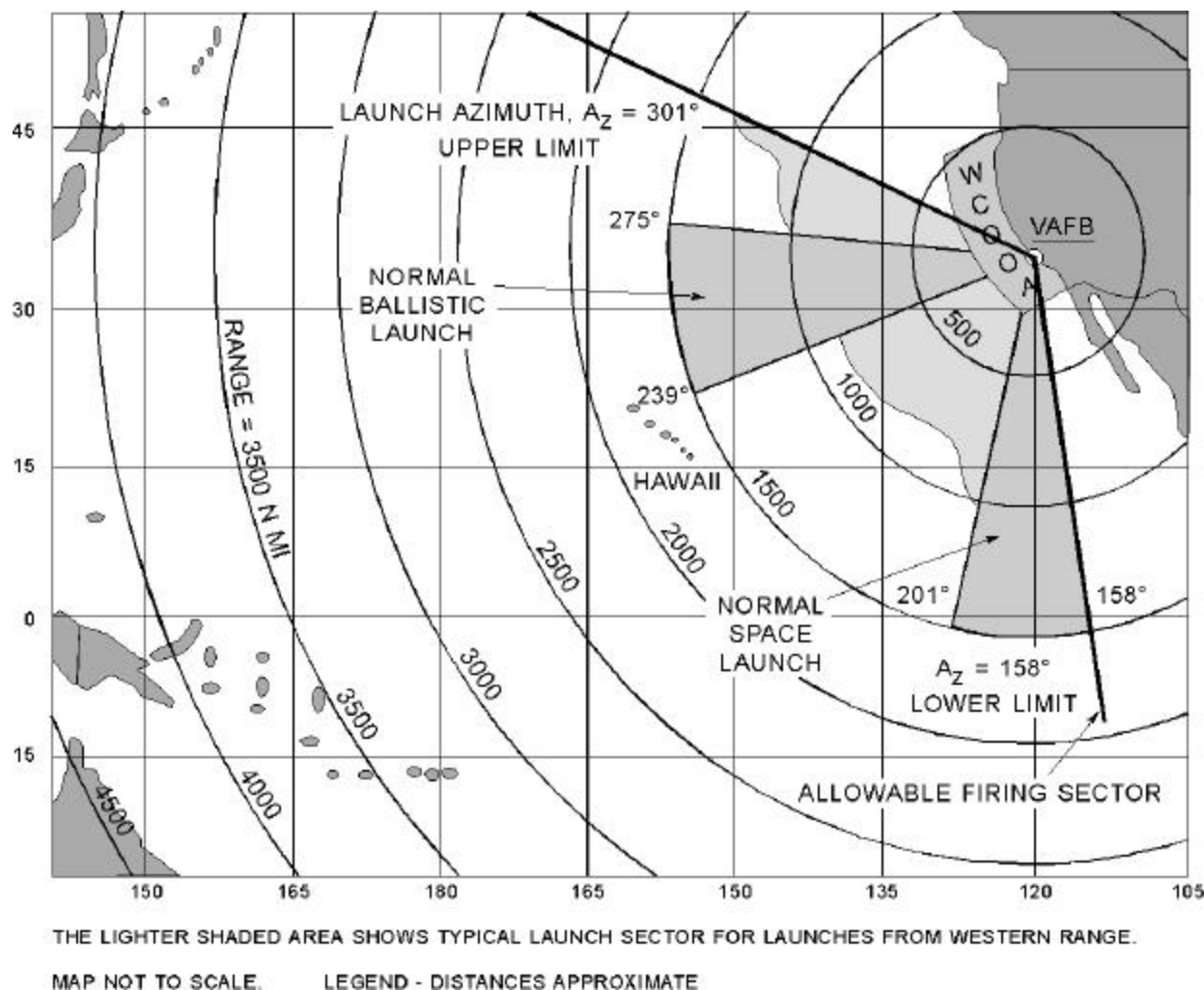


Figure 1-3
Typical Launch Sector For Launches From the Western Range

launch operations, and impact; or require on-orbit or other related support.

a. Commercial users intending to provide launch services from one of the Ranges shall be sponsored and have a license from the Department of Transportation (DOT) or have a DoD sponsorship and be accepted by the DoD to use the ER or WR.

b. Foreign government organizations or companies shall be sponsored by an appropriate US government organization or be a customer of a commercial Range User.

1.2 RANGE SAFETY PROGRAM

The national range system, established by Public Law 60, was originally sited based on two primary concerns: location and public safety. Thus, Range Safety, in the context of national range activities, is rooted in PL 60.

To provide for the public safety, the Ranges, using a Range Safety Program, shall ensure that the launch and flight of launch vehicles and payloads present no greater risk to the general public than that imposed by the overflight of conventional aircraft. In addition to public protection, safety on a national range includes launch area safety, launch complex safety, and the protection of national resources.

Range Safety is intrinsic to the range mission of providing Range Users the facilities, instrumentation, and infrastructure to support launch vehicles and payloads during prelaunch and launch operations. Significant hazards and risks are inherent to launch vehicle and payload tests and operations; therefore, all reasonable precautions shall be taken to minimize these risks with respect to life, health,

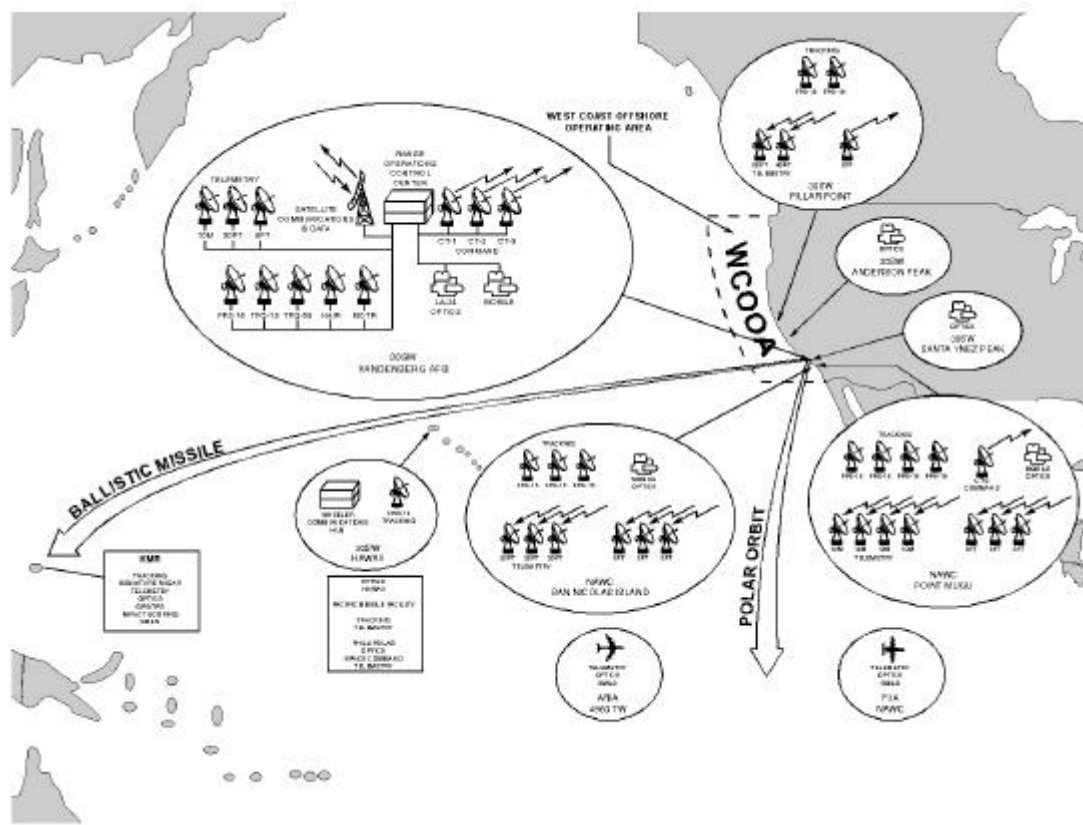


Figure 1-4
Owned or Leased Facilities On Sites Uprange Along the Pacific Coast Including US Navy Facilities at Point Mugu and Downrange From the Western Range

and property.

1.2.1 Objective of the Program

The objective of the Range Safety Program is to ensure that the general public, launch area personnel, foreign land masses, and launch area resources are provided an acceptable level of safety and that all aspects of prelaunch and launch operations adhere to public laws and national needs. The mutual goal of the Ranges and Range Users shall be to launch launch vehicles and payloads safely and effectively with commitment to public safety.

1.2.2 Purpose of the Requirements

Through these requirements, the ER and WR Safety Programs implement and carry out the responsibilities or standards contained in or applied by the following laws and directives:

- a. Public Law 60, Legislative History, 81st Con-

gress

- b. Public Law 10, 10 USC, Section 172

c. Public Law 91-596, 29 USC. **NOTE:** Contractors are solely responsible for compliance with OSHA standards and the protection of their employees.

- d. Public Law 98-575, 49 USC

e. Presidential Directive (PD)/National Security Council (NSC) 25

- f. Department of Defense Directive 3200.11

- g. Department of Defense Directive 3230.3

1.2.3 Rationale for the Requirements

This document provides a baseline generic approach for Range Users and Range organizations that use the ER or WR to handle, store, assemble, checkout, and launch launch vehicles and their associated payloads. The document is written to

cover a multitude of programs and Range Users. It spans a wide range of complex systems from the launch of the manned space shuttle to loading war-shot torpedoes on submarines. The document has been developed as a baseline document for the following reasons:

a. Past experience and input from Range Users regarding concerns about referenced documents, particularly military standards and military specifications, causing a tiering effect with the result that designers have difficulty understanding which specific requirements apply to a given design

b. Standardized design and safety requirements for many aerospace hazardous systems that do not exist except in this document

c. The need for a set of standards that, through experience, ensures a prudent level of public safety protection is provided during prelaunch and launch operations

d. The need for a set of minimum criteria and requirements to ensure launch area safety since commercial users are not required to directly use military standards or military specifications in the design of their hazardous systems except for flight termination systems required by the Ranges. Therefore, to ensure each Range User is protected from the activities of others, this baseline document provides a set of minimum criteria and requirements to ensure launch area safety.

e. Wherever possible, military standards (MIL-STDs) and military specifications (MIL-SPECs) will be replaced with equivalent commercial standards. Anywhere a MIL-STD or MIL-SPEC is referenced in this document, an equivalent commercial standard may be used. However, both 45 SW/SE and 30 SW/SE shall recognize and approve the equivalency of the commercial standard prior to its use. As commercial standards and specifications are developed and approved, this document will be updated to list and/or incorporate them.

1.2.4 Applicability of the 1997 Edition of EWR 127-1

This edition of EWR 127-1 is applicable to all new programs with Program Introduction submittals dated after 31 October 1997. **NOTE:** Programs that have begun significant design prior to this date and with Program Introductions occurring at a later date may submit a program milestone schedule (cDR, PDR, CDR, PI, document submittals, and

other items) and request Range Safety concurrence that the edition/revision of 127-1 at the time of design commencement is acceptable. However, all Range Users are encouraged to perform Program Introductions at the earliest possible time in the program.

1.2.4.1 Status of Previously Approved Programs

Existing program approval and compliance agreements on Range User flight hardware systems and subsystems and ground support equipment, facilities, operations, and procedures, including all deviations, waivers, and meets intent certifications, approved prior to 31 October 1997 shall be honored and do not have to meet the requirements in this document unless it is determined by the Chief of Safety or the Range User that one or more of the situations listed in a through g below exist. **NOTE:** The exceptions also apply to programs that are approved in accordance with this document, when application of previously non-enforced requirements of this document are contemplated.

a. Existing programs make major modifications or include the use of currently approved components, systems, or subsystems in new applications. *EXCEPTION: Previously approved existing components, systems, or subsystems that do not increase the risks, do not degrade safety, or can survive new environments or the new environments are equivalent to or lower than the originally approved qualification levels shall be honored and do not have to meet new requirements as long as data and analyses submitted to and approved by Range Safety show that the criteria have been met.*

b. The Range User has determined that it is economically and technically feasible and desirable to incorporate new requirements into the system.

c. The system has been or will be modified to the extent that it is considered a new program or that existing safety approvals no longer apply. **NOTE:** Risk and hazard analyses in accordance with Appendix 1B and developed jointly by Range Safety and the Range User shall be used by Range Safety to determine applicability of the safety approvals.

d. A previously unforeseen or newly discovered safety hazard exists that is deemed by either Range Safety or by the Range User to be significant enough to warrant the change.

e. The system does not meet the requirements existing when the system was originally accepted.

NOTE: This category includes systems that were previously approved, but when obtaining the approval, noncompliances to the original requirement were not identified.

f. A system or procedure is modified and a new requirement reveals that a significant risk exists.

g. Mishap and incident investigations and reports may dictate compliance with this edition of the document.

1.2.4.2 Implementation of Required Changes

All program hardware and operational changes required by the imposition of a new Range Safety requirement shall be implemented in a manner and on a schedule that minimizes the impact on the program and that is agreed to by both the Range User and Range Safety.

1.3 RESPONSIBILITIES AND AUTHORITIES

PL 10, PL 60, PL 98-575, and PD/NSC 25, as implemented by DoDDs 3200.11 and 3230.3, define public, international, launch area, and launch complex safety requirements and establish the responsibility for safety on the Range.

1.3.1 Commanders, 45th Space Wing and 30th Space Wing

a. Final authority and responsibility for safety at the ER and WR rests with the Space Wing Commanders (Range Commanders). The Range Commander or a designated representative is responsible for carrying out the Range Safety Program described in this document.

b. The Wing Commanders shall implement, handle noncompliances, and/or disposition the requirements of this document as it applies to Range User programs on their Range.

c. Where feasible, the Wing Commanders shall coordinate all actions between the Ranges to ensure that consistent and standard Range Safety requirements and approvals are levied on all Range Users.

1.3.2 Chiefs of Safety, 45th Space Wing and 30th Space Wing

The Chiefs of Safety, the designated representatives of the Wing Commanders/Range Commanders, are responsible for establishing, complying with, implementing, and directing the Range

Safety Program. The Chiefs of Safety responsibilities include the following:

a. Enforcing public safety requirements; defining launch area safety and launch complex safety requirements for mission flight control and other Range Safety launch support operations

b. Reviewing and coordinating changes with the Range User and providing Range Safety approval for operational procedures along with oversight for all prelaunch operations at the launch complex and launch vehicle or payload processing facilities for public safety and launch area safety concerns

c. Reviewing, providing Range Safety approval, and auditing operations at a launch complex and associated support facilities for launch complex safety concerns in accordance with a jointly accepted Launch Complex Safety Training and Certification program. **NOTE:** If the Range User control authority decides not to implement the plan then Range Safety will assume complete safety responsibility per subparagraph *b* above.

1.3.3 Commanders, 45th Operations Group and 30th Operations Group

The Commanders, 45th Operations Group (45 OG) and 30th Operations Group (30 OG), are responsible for:

a. Complying with, implementing, and enforcing the Range Safety Program

b. Reviewing and accepting all prelaunch and launch operations procedures at CCAS and VAFB for Air Force Programs, including hazardous and safety critical procedures that may affect public safety or launch area safety, after insuring they have been approved by Range Safety

c. As a control authority, in accordance with the Launch Complex Safety Training and Certification Plan, reviewing and approving prelaunch and launch operations procedures for Air Force programs that are limited to launch complex safety concerns

d. Providing 45 SW/SE and 30 SW/SE with the instrumentation, computers, communications, command transmitter systems, weather support, and Range Safety display systems necessary to carry out prelaunch and flight safety functions. Range Safety shall provide the Operations Groups with mandatory support requirements, and the Operations Groups shall ensure that these requirements are met.

1.3.4 Commander, 45th Logistics Group

The Commander, 45th Logistics Group (45 LG), is responsible for complying with, implementing, and directing the Range Safety Program and ensuring that all required instrumentation, computers, communications, command systems, and display systems necessary for Range Safety to carry out its functions perform to the prescribed level of reliability and meet specified design requirements.

1.3.5 Commanders, 45th Support Group and 30th Support Group

The Commanders, 45th Support Group (45 SPTG) and 30th Support Group (30 SPTG), are responsible for complying with, implementing, and directing the Range Safety Program and determining, coordinating, and enforcing fire safety, environmental engineering, and explosive ordnance disposal requirements. The Fire Department, Environmental Engineering, and Explosive Ordnance Disposal are responsible for establishing and implementing their programs in coordination with the Office of the Chief of Safety.

1.3.6 Commanders, 45th Medical Group and 30th Medical Group

The Commanders, 45th Medical Group (45 MDG) and 30th Medical Group (30 MDG), are responsible for complying with, implementing, and directing the Range Safety Program and determining, coordinating, and enforcing medical, biological, and radiological health requirements. Radiation Protection Officers and Bioenvironmental Engineering are responsible for establishing and implementing their programs in coordination with the Office of the Chief of Safety.

1.3.7 Offices of the Chiefs of Safety, 45th Space Wing and 30th Space Wing

The Offices of the Chiefs of Safety, 45th Space Wing (45 SW/SE) and 30th Space Wing (30 SW/SE) ensure that the Range Safety Program complies with public law and DoD directives as noted in the **Purpose of the Requirement** section of this Chapter, meets the needs of the Ranges and Range Users, and does not impose undue or overly restrictive requirements on Range User programs. **NOTE:** Unless otherwise noted, the use of the term *Range Safety* in this Chapter refers to 45 SW/SE and 30 SW/SE. The Safety Offices provide opera-

tional, engineering, scientific, and mathematical expertise to accomplish flight analysis, system safety, mission flight control, and Air Force ground safety. Figures 1-5a and b provide charts representative of both of the Eastern and Western Range Safety Organizations. The responsibilities of these sections are slightly different and are described below:

1.3.7.1 Air Force Ground Safety, 45th Space Wing and Ground Safety, 30th Space Wing

1.3.7.1.1 Air Force Ground Safety, 45th Space Wing. Air Force Ground Safety, 45th Space Wing (45 SW/SEG) is responsible for developing and implementing a ground and industrial safety program for Air Force personnel and Air Force resources.

1.3.7.1.2 Ground Safety, 30th Space Wing. Ground Safety, 30th Space Wing (30 SW/SEG) is responsible for the following. **NOTE:** 30 SW/SEG is similar to the ER Operations Safety, a government contractor.

- a. Reviewing, coordinating, and approving procedures for prelaunch processing
- b. Monitoring selected activities at the launch head
- c. Providing prelaunch and countdown Launch Disaster Control Groups
- d. Defining Safety Clearance Zones and providing advice for the control of access to Safety Clearance Zones within the confines of the launch head
- e. Providing emergency response support and/or assistance in the event of failures and mishaps during ground operations
- f. Advising the on-site commander on disaster preparedness and responsiveness

1.3.7.2 Mission Flight Control, 45th Space Wing and 30th Space Wing

Mission Flight Control, 45th Space Wing (45 SW/SEOO) and 30th Space Wing (30 SW/SEO) are responsible for protecting the general public, the launch area, and US and foreign land masses from errant launch vehicle flight. In conjunction with Operations Support and Analysis (30 SW/SEY and 45 SW/SEOE and SEOS) and Systems Safety (SES), Mission Flight Control uses flight safety analysis and systems safety engineering products to develop and implement real-time mission rules and flight termination criteria to con-

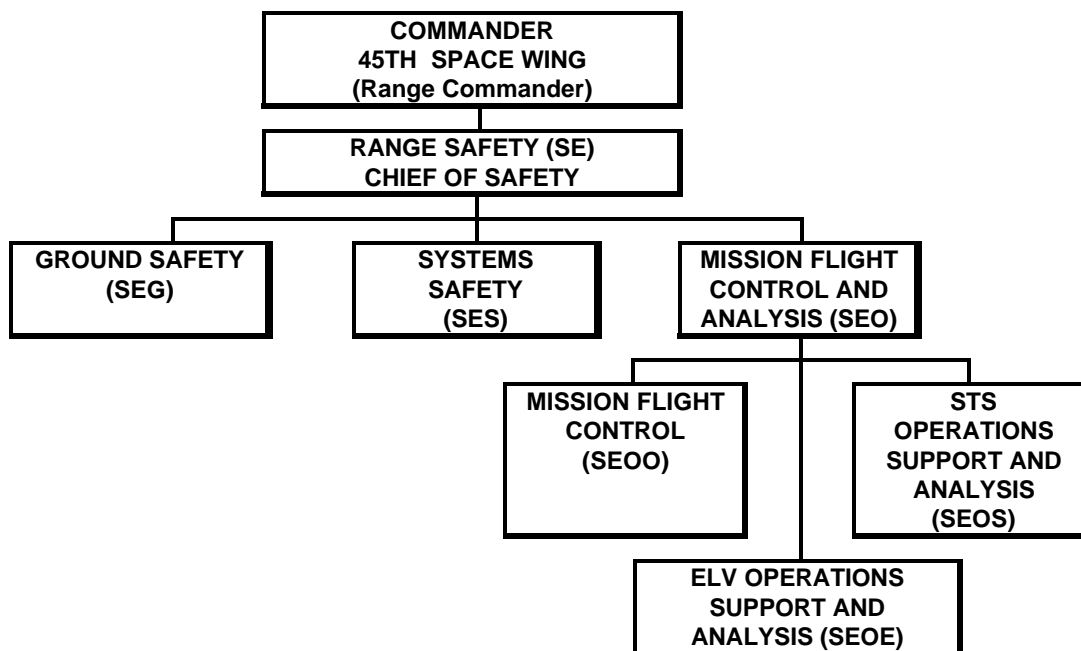


Figure 1-5a
Eastern Range Safety Organization

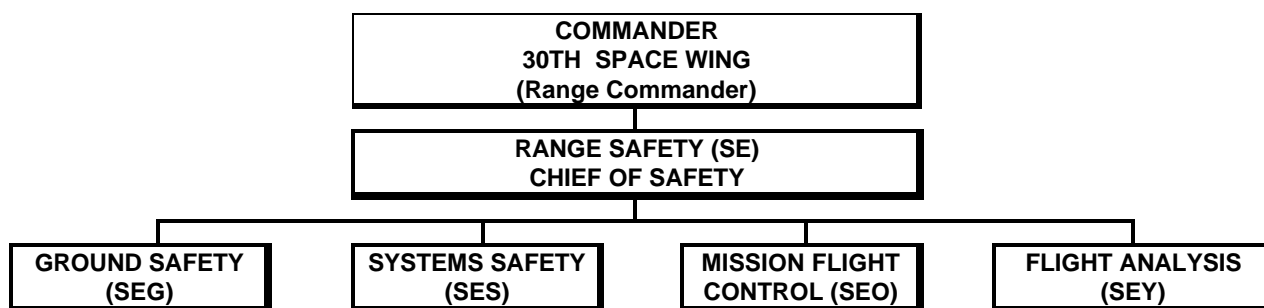


Figure 1-5b
Western Range Safety Organization

trol errant launch vehicle flight from launch to impact of vehicles with suborbital trajectories or to orbital insertion for space launch vehicles.

1.3.7.3 Systems Safety, 45th Space Wing and 30th Space Wing

Systems Safety, 45th Space Wing (45 SW/SES) and 30th Space Wing (30 SW/SES) are responsible for ensuring that public, launch area and launch complex safety and resource protection are adequately provided by and for all programs using the Ranges. Responsibilities include:

- a. Developing safety critical design and operating criteria and requirements
- b. Reviewing and approving design, test, and

documentation for airborne range safety systems.

c. Developing, enforcing, reviewing and approving engineering design, test, and documentation for hazardous launch vehicle, payload, ground support equipment, and facility systems

d. Reviewing, approving, monitoring, and classifying (as public launch area or launch complex safety) hazardous and safety critical operations

e. Providing safety engineering and developing processes and procedures to mitigate risks involved in prelaunch and launch operations for both the general public and launch area

f. At the ER, overseeing Operations Safety and ensuring they meet contract requirements

g. Operations Safety, a government contractor

for 45 SW/SES is responsible for reviewing for, monitoring for, and enforcing compliance through Range Safety and/or the appropriate launch complex control authority, with this document and other Range Safety requirements by all personnel operating as Range Users or Support Agencies on the ER, primarily during hazardous and safety critical operations. The operations and responsibilities of this organization are similar to those performed by 30 SW/SEGP on the WR.

1.3.7.4 Operations Support and Analysis, 45th Space Wing, and Flight Analysis, 30th Space Wing

Operations Support and Analysis, 45th Space Wing (45 SW/SEOE and SEOS) and Flight Analysis, 30th Space Wing (30 SW/SEY) are responsible for developing criteria for the control of errant vehicle flight to provide public safety. Responsibilities include:

- a. Approving all launch vehicle and payload flight plans
- b. Determining the need for flight termination systems
- c. Establishing mission rules in conjunction with 45 SW/SEOO and 30 SW/SEO and Range Users
- d. Determining criteria for flight termination action
- e. Assessing risks to protect the general public, launch area, and launch complex personnel and property
- f. Identifying and evaluating risk reduction actions such as evacuation, sheltering, and safety holds for suitable meteorological conditions
- g. Developing mathematical models to increase the effectiveness of errant vehicle control while minimizing restrictions on launch vehicle flight
- h. In conjunction with Mission Flight Control, ensuring that Mission Flight Control Officers are trained to perform errant launch vehicle control
- i. Determining collision avoidance (COLA) requirements for mannable objects

1.3.7.5 Relationship with Range Users

Each of the Safety Office sections is responsible for initiating, establishing, and implementing Range User interface processes to ensure that the requirements of this document are met and, if desired, tailored to meet individual Range User program requirements. The interface process is described in the **Range Safety and Range User Interface**

Processes section of this Chapter.

1.3.8 Range Users and Supporting Agencies

Range Users and supporting agencies are responsible for the following:

- a. Providing safe systems, equipment, facilities, and materials in accordance with this document
- b. Conducting their operations in a safe manner that complies with and implements those portions of the Range Safety Program that are applicable to their programs
- c. Obtaining review and approval for the following documents:
 1. Tailored versions of EWR 127-1, as desired, System Safety Program Plans (SSPP), noncompliance requests, and Launch Complex Safety Training and Certification Plans (See Appendixes 1A, 1B, and 1C of this Chapter.)
 2. Preliminary and Final Flight Data Packages (PFDP and FFDP), Aircraft and Ship Intended Support Plans (ISPs), and Directed Energy Plans (DEPs) (See Chapter 2.)
 3. Missile System Prelaunch Safety Package (MSPSP) (See Chapter 3 and Appendix 3A.)
 4. Airborne Range Safety System Report (RSSR) (See Chapter 4 and Appendix 4A.)
 5. Facility Safety Data Packages (FSDP) as required for all critical facilities and launch complexes (See Chapter 5 and Appendix 5A.) and explosive quantity distance site plans
 6. Ground Operations Plans (GOP) and Hazardous and Safety Critical Procedures (See Chapter 6 and Appendixes 6A and 6B.)
- d. Submitting data for flight control operations, obtaining a Range Safety Launch Operations Approval Letter or verbal approval at the Launch Readiness Review, and participating in safety critical operations (See Chapter 7.)
- e. As applicable, ensuring compliance with the National Aeronautics and Space Council document *Nuclear Safety Review and Approval Procedure for Minor Radioactive Sources in Space Operations*
- f. As applicable, ensuring compliance with Presidential Directive/NSC 25 as outlined in DoDD 3200.11 and AFI 91-110
- g. As applicable, ensuring that the requirements of PL 98-575 and DOT Office of Commercial Space Transportation (OCST) 14 CFR, Chapter III are met

h. Performing risk analyses and implementing contingency plans to protect the general public in the event of a threat from de-orbiting launch vehicles. **NOTE:** DOT commercial licenses normally address these analyses for commercial programs.

i. Coordinating their safety programs with Range Safety to ensure the activities of both organizations meet national policy goals and provide for public and launch site safety and resource protection while minimizing impact on mission requirements

j. Providing for crew safety in manned space launch systems and coordinating crew safety policy, procedures, and activities with the Office of the Chief of Safety

k. Verifying compliance with this document. **NOTE:** The use of subcontractors does not relieve the Range User of responsibility. The Range User shall provide adequate contractual direction and monitor subcontractor performance to verify compliance.

l. As applicable, when involved in joint projects, interfacing and integrating with other Range Users or associated contractors in their safety programs

1.4 RANGE SAFETY POLICY

a. It is the policy of the Ranges to ensure that the risk to the public, to personnel at the launch area, and to national resources is minimized to the greatest degree possible. This policy shall be implemented by employing risk management in three categories of safety: Public Safety, Launch Area Safety, and Launch Complex Safety.

b. The Range User shall endeavor to maintain the lowest risk possible, consistent with mission requirements, and in consonance with ER and WR launch risk guidance. **NOTE:** Individual hazardous activities may exceed guidance based on national need after implementation of available cost-effective mitigation. The **Launch Area Safety** section of this Chapter includes formulations for evaluating cost-effectiveness.

c. The Wing Commanders may vary from this criteria for particular programs or missions based on geography, weather, and national need; however, the basic standard is no more than that voluntarily accepted by the general public in normal day-to-day activities.

d. Launch risk guidance has been established based on a standard of a collective risk level of not

more than 30 casualties in 1 million (30×10^{-6}) for the general public and not more than 300 casualties in 1 million (300×10^{-6}) for essential launch area personnel. The basic standard for the general public is not more than the risk voluntarily accepted in normal day-to-day activities. Further information on acceptable risk criteria may be found in Appendix 1D.

e. Imminent danger situations are subject to the following:

1. Immediate action shall be taken by the supervisor or individual responsible for the immediate area to correct the situation, apply interim control measures, stop the operation, and evacuate all personnel.

2. Any operation, condition, or procedure that presents imminent danger shall be brought to the immediate attention of the supervisor or individual responsible for the immediate area.

3. All imminent danger situations shall be reported to Range Safety not later than 1 h from the time the situation is identified.

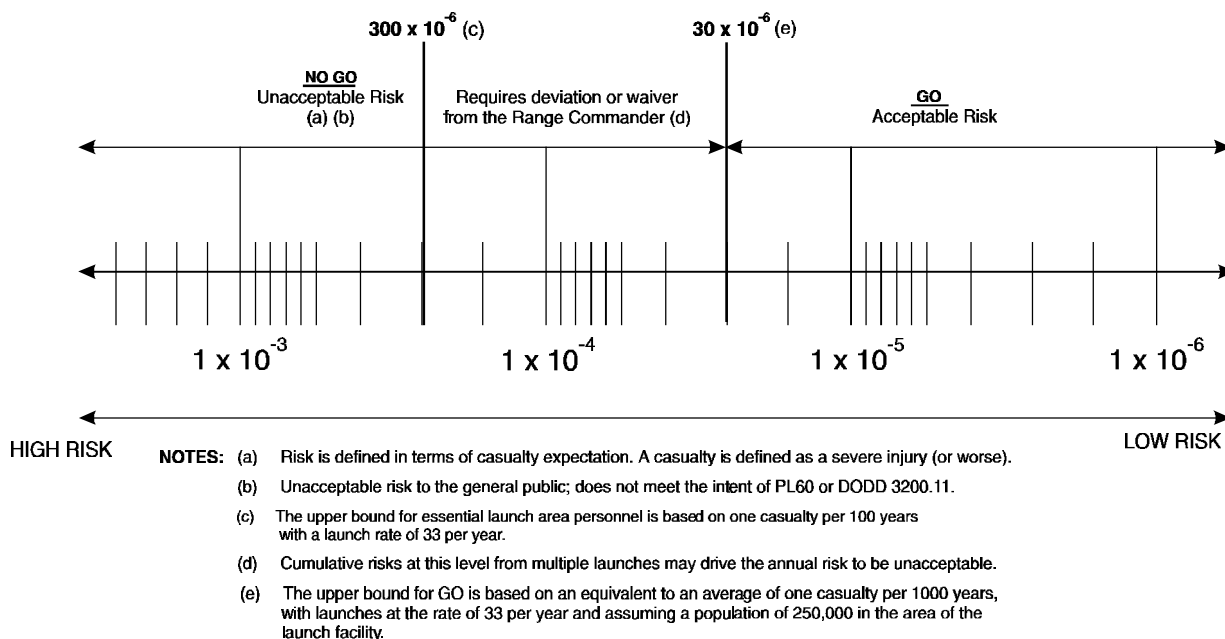
4. Personnel may decline to perform assigned tasks because of a reasonable belief that, under the circumstances, the task presents imminent danger, coupled with a reasonable belief that there is insufficient time through normal reporting for abatement procedures to correct the situation.

1.4.1 Public Safety

The Ranges shall strive to ensure that the risk to the general public and foreign countries from Range operations meets the criteria established in PL 60, Legislative History. Figure 1-6 shows the risk management criteria guidance to be used for determining acceptable risk for individual launches. The figure of 30×10^{-6} shall be used by both Ranges as a level defining “acceptable launch risk without high management (Range Commander) review.” Based on national need and the approval of the Range Commander/Wing Commanders, launches may be permitted using a predicted risk above 30×10^{-6} .

1.4.1.1 Prelaunch and Launch Operations

a. Range Safety shall review, approve, and through Operations Safety, monitor, and impose safety holds when necessary, on all prelaunch and launch operations conducted on the Ranges to ensure that the hazards associated with propellants,



("From a Safety Standpoint they [missiles] will be no more dangerous than conventional airplanes flying overhead." Legislative History, 81st Congress, pg. 1235)

Figure 1-6
Acceptable Public Exposure Launch Operation Risk Guidance

ordnance, radioactive material, and other hazardous systems do not expose the general public to risks greater than those considered acceptable by public law and state documents, such as PL 99-499, 29 CFR 1910.119, 40 CFR 355, Executive Order 12856, and CAL-OSHA.

b. Range Safety shall conduct and oversee launch vehicle, payload, mission flight control, and Range Safety launch support operations to ensure that risks to the general public and foreign countries and their property do not exceed acceptable limits consistent with mission and national needs.

c. Range Safety shall ensure that each Range User provides each launch system with a capability that allows Range Safety to initiate a hold-fire that prevents launch in the event of loss of Range Safety critical systems or violation of mandatory Range Safety launch commit criteria (Appendix 7A).

1. Safety holds shall be initiated to prevent the start of a launch operation or to stop a launch operation that is already underway if it violates public, launch area, or launch complex safety or launch commit criteria.

2. Safety holds may be called if Range Safety launch commit criteria are violated or if adequate safety cannot be ensured or verified when personnel

or resources are jeopardized.

3. Safety holds may be initiated by the Mission Flight Control Officers, Operations Safety Manager, Range Control Officers, Range Operations Commander (WR), Aerospace Control Officer (WR), Range User, or any responsible supervisor in charge of a launch operation.

1.4.1.2 Range Safety Critical Systems

Range Safety critical systems include all airborne and ground subsystems of the Range Safety System. The Range Safety System consists of airborne and ground flight termination systems (FTSs), airborne and ground Range Tracking Systems (RTSs), and the Telemetry Data Transmitting System (TDTS).

a. All Range Safety critical systems shall be designed to ensure that no single point of failure, including software, will deny the capability to monitor and terminate or result in the inadvertent termination of a launch vehicle or payload, as applicable.

b. The reliability requirements of the Range Safety System are as follows:

1. The overall airborne and ground FTS reliability goal is 0.9981 at the 95 percent confidence

level.

(a) The airborne FTS reliability goal shall be a minimum of 0.999 at the 95 percent level. This goal shall be met by combining the design approach and testing requirements of Chapter 4 of this document.

(b) The ground FTS shall have a reliability of 0.999 at the 95 percent confidence level for a 4 h duration, as required.

2. The overall airborne and ground Range Tracking System (RTS) reliability is a function of the following requirements:

(a) The airborne RTS reliability shall be 0.995 at the 95 percent confidence level for transponder systems and 0.999 at the 95 percent confidence level for global positioning systems. These goals shall be met by combining the design approach and testing requirements of Chapter 4 of this document.

(b) The ground RTS reliability shall be 0.999 at the 95 percent confidence level for a 1 h duration, as required.

3. There are no reliability requirements for the TDTS.

c. When possible, Range Safety critical systems shall be designed to allow single failures in hardware and software and still provide overall system redundancy.

d. Other systems determined to be Range Safety critical shall have a design reliability of 0.999 at the 95 percent confidence level.

1.4.1.3 Control of Errant Vehicle Flight

a. Range Safety shall verify that all launch vehicles launched from or onto the Ranges have a positive, range-approved method of controlling errant vehicle flight to meet the objective of minimizing risks to the general public and foreign countries.

NOTE: Normally, control systems on launch vehicles using the Ranges shall consist of an airborne Range Safety System that shall meet all the requirements of Chapters 2, 4, and 7 of this document. A thrust termination system may be considered as an alternative to a Range Safety System; however, quantification of risks must be determined, and the requirements in Chapter 2 shall be met. The alternative thrust termination concept and design shall be approved by the Range Commander.

b. Range Safety shall establish flight termination

criteria and Range Safety mission flight rules to ensure that operations do not exceed acceptable public safety limits.

c. Range Safety shall establish and control Hazardous Launch Areas and procedures to protect the public on land, on the sea, and in the air for each launch and launch vehicle using the Ranges and to ensure the following criteria are met:

1. No intact launch vehicle, scheduled debris, or payload, or launch vehicle and payload subsystems shall be allowed to intentionally impact on land except in the launch area inside the impact limit lines.

2. Flight paths and trajectories shall be designed so that normal impact dispersion areas do not encompass land.

3. Safety margins shall be used to avoid overly restrictive flight termination (destruct) limits.

d. Range Safety may allow errant launch vehicles to fly to obtain maximum data until they would present an unacceptable risk to the public or until Range Safety can no longer control the launch vehicle.

1.4.2 Launch Area Safety

The Ranges shall ensure that all personnel located on CCAS or VAFB or on any supporting site within the ER or WR are provided protection from the hazards associated with Range operations.

a. Table 1-1 shows nominal launch area and launch complex hazard consequence and probability categories correlated to different levels of acceptability for prelaunch hazards not associated with launch or Range Safety launch commit criteria. Numbers provided in Table 1-1 are guides only and are not necessarily hard limits.

b. Range Safety shall provide errant launch vehicle control protection for the launch area, including CCAS, KSC, and VAFB.

c. Range Safety shall conduct risk studies and analyses to determine the risk levels, define acceptable risk levels, and develop exposure criteria.

d. Range Safety shall establish design criteria and controls, procedures, and processes to minimize personnel risks and ensure acceptable launch area/complex risk levels are not exceeded.

e. Range Safety shall evaluate all launch vehicle, payload, ground support, and facility systems used on the Ranges to test, checkout, assemble, handle, support, or launch launch vehicles or payloads with

regard to their hazard potential and ensure they are designed to minimize risks to personnel and fall within acceptable exposure levels.

f. Range Safety shall ensure that all hazardous operations affecting launch area safety are identified and conducted using Range Safety approved formal written procedures. Through Operations Safety, Range Safety shall ensure launch area safety is provided in accordance with this document and approved Operations Safety Plans.

g. Range Safety shall define the threat envelope of all hazardous operations affecting launch area safety and establish Safety Clearance Zones to protect personnel and resources. **NOTE:** A minimum number of personnel shall be exposed to the minimum hazard level consistent with efficient task accomplishment.

h. Range Safety shall ensure all personnel performing hazardous operations that may impact launch area safety are provided adequate training to ensure proper conduct of their jobs and tasks by

reviewing Range User training plans.

Table 1-1
Acceptability Guidelines for Prelaunch Launch Area/Launch Complex Hazard Consequences and Probability Categories

HAZARD SEVERITY	POTENTIAL CONSEQUENCES				PROBABILITY*				
Category	Personnel Illness/Injury	Equipment Loss(\$)	Unit Downtime	Data Compromise	A	B	C	D	E
I Catastrophic	May cause death.	> 1,000,000	> 4 months	Data is never recoverable or primary program objectives are lost.					
II Critical	May cause severe injury or severe occupational illness.	200,000 to 1,000,000	2 weeks to 4 months	May cause repeat of test program.					
III Marginal	May cause minor injury or minor occupational illness.	10,000 to 200,000	1 Day to 2 Weeks	May cause repeat of test period.					
IV Negligible	Will not result in injury or occupational illness.	< 10,000	< 1 Day	May cause repeat of data point, or data may require minor manipulation or computer rerun.					

RISK PRIORITY:  Unacceptable  Waiver or deviation required  Operation permissible

*Probability refers to the probability that the potential consequence will occur in the life cycle of the system (test/activity/operation). Use the following list to determine the appropriate Risk Level.

DESCRIPTION**	THRESHOLD LEVEL	PROBABILITY VALUE	SPECIFIC INDIVIDUAL ITEM	FLEET OR INVENTORY***
A Frequent	8X10 ⁻²	3X10 ⁻¹	Likely to occur repeatedly	Continuously experienced
B Reasonably probable		3X10 ⁻²	Likely to occur several times	Will occur frequently
C Occasional	8X10 ⁻³	3X10 ⁻³	Likely to occur sometime	Will occur several times
D Remote	8X10 ⁻⁴	3X10 ⁻⁴	Unlikely to occur, but possible	Unlikely, but can reasonably be expected to occur
E Extremely Improbable	8X10 ⁻⁵	3X10 ⁻⁵	The probability of occurrence cannot be distinguished from zero.	Unlikely to occur, but possible

** Definitions of descriptive words may have to be modified based on quantity involved.

*** The size of the fleet or inventory and system life cycle should be defined.

i. Launch Area Resource Protection

1. The Ranges shall ensure that launch area physical resources are provided an acceptable degree of protection based on federal law and national standards.

2. Procedures and policies that are applied for public and launch area safety shall be used to reduce risks to launch area physical resources to acceptable levels.

3. Siting, design, and use of physical resources shall consider potential hazards and threat envelopes to ensure that damage exposure is limited to acceptable levels as defined by federal law and national consensus standards.

1.4.3 Launch Complex Safety

The single commercial user, full-time government

tenant organization or USAF squadron/detachment commander, as the control authority has the responsibility for launch complex safety and will exercise the function in accordance with the Launch Complex Safety Training and Certification requirements. The control authority has the option of delegating this responsibility to the Chiefs of Safety. **NOTE:** The control authority for safety as defined in this document includes areas within a complete launch complex (or missile silo) and adjacent facilities used by each agency for launch vehicle and/or payload processing. In all cases, the Chiefs of Safety shall review and approve all hazardous operating procedures and any other procedures that Range Safety may review to insure such operations do not pose or create a hazardous condition.

1.4.3.1 General Requirements

a. Regardless of whether the control authority or Range Safety takes responsibility for launch complex safety, the following general requirements apply:

1. Range Safety shall provide errant launch vehicle control protection for the launch area, including CCAS, KSC, and VAFB and all launch complex locations therein.

2. Range Safety shall conduct risk studies and analyses to determine and define launch complex acceptable risk levels and develop exposure criteria.

3. Range Safety shall establish design criteria and controls, procedures, and processes to minimize launch area and launch complex personnel risks and ensure acceptable risk levels are not exceeded.

4. Range Safety shall evaluate all launch vehicles, payloads, ground support, and facility systems used on the Ranges to test, checkout, assemble, handle, support, or launch vehicles or payloads with regard to their hazard potential and ensure they are designed, tested, and maintained to minimize risks to launch complex personnel and fall within acceptable exposure levels.

b. If the control authority assumes responsibility for launch complex safety, the following general requirements apply:

1. As requested, Range Safety shall provide technical advice, requirements interpretation, and safety guidance to the control authority for launch complex safety issues.

2. Range Safety shall audit launch complex hazardous and safety critical procedures to ensure compliance with this document.

1.4.3.2 Launch Complex Safety Responsibility

The organization responsible for launch complex safety, either Range Safety or the launch complex control authority (AF Squadron Commanders for AF programs), is subject to the following requirements:

a. Hazardous Operations

1. If requested by the control authority, Range Safety shall ensure that all hazardous operations affecting launch complex safety are conducted using Range Safety approved formal written procedures. Through Operations Safety, Range Safety shall ensure launch complex safety is provided in

accordance with this document and approved Operations Safety Plans.

2. If assuming responsibility, the control authority shall ensure that all hazardous operations affecting launch complex safety are conducted using formal written procedures approved by a space safety professional. In accordance with Launch Complex Safety Training and Certification Requirements, the control authority shall ensure launch complex safety is provided in accordance with this document and approved Operations Safety Plans.

b. Either the control authority or Range Safety, if requested, shall define the threat envelope of all hazardous operations affecting launch complex safety and establish Safety Clearance Zones to protect launch complex personnel and resources. **NOTE:** A minimum number of personnel shall be exposed to the minimum hazard level consistent with efficient task accomplishment.

c. Either the control authority or Range Safety, if requested, shall ensure all personnel performing hazardous operations that may impact launch complex safety are adequately trained to perform their jobs and tasks.

d. Either the control authority or Range Safety, if requested, shall ensure that adequate personal protective equipment is provided as defined by this document and approved Operations Safety Plans.

e. The areas and facilities for which the control authority has responsibility for launch complex safety are available from the Range Safety Offices.

f. Launch Complex Resource Protection

1. The Ranges and control authorities shall ensure that launch complex physical resources are provided an acceptable degree of protection based on federal law and national consensus standards.

2. Procedures and policies that are applied for public, launch area, and launch complex safety shall be used to reduce risks to launch complex physical resources to acceptable levels.

3. Siting, design, and use of physical resources shall consider potential hazards and threat envelopes to ensure that damage exposure is limited to acceptable levels as defined by federal law and national consensus standards.

4. Launch complex resource protection issues shall be coordinated between Range Safety and the affected Range Users.

(a) USAF squadron or detachment Com-

manders shall be responsible for implementing resource protection requirements for all DoD flight hardware, ground support equipment, and facilities within their assigned areas.

(b) US Navy, NASA, and other government tenant organizations shall be responsible for all tenant-occupied facilities and tenant-owned equipment.

(c) The CCAS Commander shall be responsible for implementing of resource protection requirements for an area on CCAS not assigned to a specific USAF squadron or detachment commander or other Range User.

(d) Commercial Range Users shall be responsible for commercially owned, leased, or licensed physical resources

1.4.3.3 Launch Complex Safety Training and Certification Requirements

The control authority shall implement a Launch Complex Safety Training and Certification Plan in accordance with the Launch Complex Safety Training and Certification Requirements available from the Range Safety Offices. This process includes the following steps:

a. Range Safety and the control authority jointly tailor the subject document.

b. The control authority submits a plan to comply with the subject document.

c. Range Safety reviews and approves the plan.

d. The complex control authority safety plan shall include qualification and certification documentation of personnel performing the safety function for review and approval by the Chiefs of Safety.

e. Range Safety shall audit launch complex safety procedures and processes as necessary.

1.5 SAFETY AUTHORIZATIONS, COMPLIANCES, AND DOCUMENTATION

1.5.1 Purpose of Obtaining Safety Approvals

a. To operate, use, and launch launch vehicles and payloads from or onto the Ranges, specific mandatory safety approvals shall be obtained to show compliance with and meet the requirements of the Ranges.

b. Commercial users providing launch services shall have an approved DOT license in accordance with DOT OCST 14 CFR Chapter III and meet the

requirements of PL 98-575.

1.5.2 Authorizations

a. Programs launching from only the ER or WR shall obtain authorizations from the appropriate 45 SW or 30 SW authority.

b. Programs launching from both the ER and WR shall obtain authorizations for common requirements from appropriate 45 SW and 30 SW authorities.

c. Unique requirements shall require authorizations from the appropriate 45 SW or 30 SW authority.

d. In general, if a program is approved at the ER or WR, it will be approved at the other without further review with the exception of ER or WR specific requirements identified in this document, design or operational changes to the program due to the change of processing location (a new GOP and hazardous procedures are normally always required), and the exceptions identified in items *a* through *g* of the **Status of Previously Approved Programs** section of this Chapter.

1.5.2.1 Safety Approvals Authorized by the Wing Commanders

The following safety approvals shall be authorized by the Wing Commanders:

a. Tailored versions of EWR 127-1 affecting public safety

b. Range Safety mission flight rules, including termination (errant vehicle control) criteria for all launch vehicles

c. Range Safety launch commit criteria for all launch vehicles

d. The launch of launch vehicles containing explosive warheads

e. The launch of nuclear payloads

f. Noncompliances affecting public safety

1.5.2.2 Safety Approvals Authorized by the Chief of Safety or a Designated Representative

The following safety approvals shall be authorized by the Chief of Safety or a designated representative:

a. Tailored versions of EWR 127-1 not affecting public safety

b. Noncompliances not affecting public safety

c. System Safety Program Plan

d. Launch Complex Safety Training and Certification Plan

- e. Preliminary and Final Flight Data Packages
- f. Aircraft and Ship Intended Support Plans
- g. Directed Energy Plans
- h. Missile System Prelaunch Safety Package
- i. Airborne Range Safety System Report
- j. Hazardous and Safety Critical Procedures
- k. Facilities Safety Data Package
- l. Range Safety Launch Operations Approval Letter
- m. Final Range Safety Approval for Launch
- n. Range Safety instrumentation, tracking, data, and display requirements for all launch vehicles

1.5.2.3 Launch Complex Safety Approvals Authorized by Control Authorities

Control authorities may approve hazardous and safety critical procedures associated with launch complex safety in accordance with Launch Complex Safety Training and Certification Requirements.

1.5.2.4 Safety Approvals Authorized by the DoD Explosive Safety Board

Explosive site plans require the signature of a member of the DoD Explosive Safety Board (DDESB).

1.5.3 Radioactive Material Launches

All Range Users shall notify Range Safety of any intended launch of radioactive materials during the concept phase of the program.

1.5.3.1 National Aeronautics and Space Council Compliance

As applicable, all Range Users shall certify compliance with the National Aeronautics and Space Council (NASC) document, *Nuclear Safety Review and Approval Procedures for Minor Radioactive sources in Space Operations*, dated 16 June 1970. Range Users may use their own agency equivalent document if it meets the requirements of the NASC document. Detailed information and procedures are in Chapter 3.

1.5.3.2 Presidential Directive/National Security Council 25 Compliance

As applicable, all Range Users contemplating launch of a major radioactive source shall comply with PD/NSC 25 as outlined in DoDD 3200.11 and AFI 91-110. Detailed information and procedures are in Chapters 2 and 3.

1.5.3.3 Radioactive Material Launch Approval

All Range Users shall certify and show proof to Range Safety that they have obtained launch approval for radioactive materials. Detailed information and procedures are in Chapters 2 and 3.

1.5.4 Documentation and Activity Requirements

Chapters 2 through 7 of this document have **Documentation Requirements** sections. These sections describe the documents that shall be submitted and the processes that shall be used to obtain the necessary approvals to launch from the Ranges. In addition, appendixes in Chapters 2, 3, 4, 5, and 6 provide detailed document content requirements that shall be met for some, but not all required documents. All other documentation noted in the specific chapters shall also be approved as indicated in the respective chapters. **NOTE 1:** While developing the documentation requirements, Range Users are encouraged to work closely with Range Safety to facilitate the approval process. **NOTE 2:** The Range User Handbook provides additional helpful information regarding documentation requirements.

1.5.4.1 Tailored EWR 127-1, System Safety Program Plan, Noncompliance Requests, and Launch Complex Safety Training and Certification Plan

a. If desired, a Range User and Range Safety jointly tailored EWR 127-1 may be developed. (See Appendix 1A for further information.)

b. A Systems Safety Program Plan (SSPP) shall be approved within 45 days of any program cDR. (See Appendix 1B for further information.)

c. Noncompliance requests shall be submitted for all identified noncompliances to this document. (See Appendix 1C for further information.)

d. If a control authority desires to assume launch complex safety responsibility, a Launch Complex Safety Training and Certification Plan shall be approved prior to assumption of this responsibility.

1.5.4.2 Flight Data Packages, Intended Support Plans, and Directed Energy Plans

a. The PFDP and FFDP shall be approved prior to support final Launch Readiness Reviews (LRRs).

b. ISPs shall be approved prior to the LRR.

c. DEPs shall be approved prior to the LRR.

d. PFDP, FFDP, ISP, and DEP content requirements may be found in Chapter 2.

1.5.4.3 Missile System Prelaunch Safety Package

a. The MSPSP including design documentation, initial test plans and test reports, and recertification requirements for all hazardous and safety critical launch vehicle and payload systems, ground support equipment, facilities, their interfaces, and operations shall be approved prior to hardware arrival and/or use at the Ranges. **NOTE:** The National Aeronautics and Space Administration (NASA) is responsible for providing review and approval for potential hazardous systems and activities on KSC, except for launch vehicle flight safety, which is the responsibility of the ER.

b. Content and submittal requirements for the MSPSP can be found in Chapter 3 and Appendix 3A.

1.5.4.4 Airborne Range Safety System Report

a. The airborne RSSR, including all design documentation and test plans and test reports for the FTS, RTS, and TDTS shall be approved prior to launch.

b. Content and submittal requirements can be found in Chapter 4 and Appendix 4A.

1.5.4.5 Ground Operations Plan and Hazardous and Safety Critical Procedures

a. The GOP shall be approved prior to the start of operations at the Ranges.

b. Content and submittal requirements for the GOP can be found in Chapter 6 and Appendix 6A.

c. Hazardous and safety critical procedures shall be approved by Range Safety prior to their use at the Ranges.

d. Content and submittal requirements for Hazardous and Safety Critical Procedures may be found in Chapter 6 and Appendix 6B.

1.5.4.6 Facilities Safety Data Package

a. The FSDP shall be approved prior to facility use.

b. Content and submittal requirements for the FSDP may be found in Chapter 5 and Appendix 5A.

1.5.4.7 Launch Operations Approval

a. WR. A Range Safety Launch Operations Approval Letter to launch from or onto the WR shall be provided to the Range User no later than the scheduled LRR conducted prior to a planned launch operation. Receipt of this letter depends on the Range User having obtained the previously required approvals described in this Chapter.

b. ER. Launch Operations Approval Letters are not normally used on the ER. Wing Safety's GO at the LRR constitutes approval to launch and is contingent upon the Range User having obtained the required approvals identified in this Chapter. However, a Range Safety Launch Operations Approval Letter can be provided, if requested.

c. Lack of Launch Operations Approval may result in the launch being withdrawn from the Range schedule.

1.5.4.8 Final Range Safety Approval to Launch

a. Holdfire checks, Range Safety System checks, and other safety critical checks shall be performed satisfactorily; environmental conditions shall be met; and all Range Safety launch commit criteria shall be "green" prior to final approval to launch.

b. Given that holdfire checks, Range Safety System checks, other safety critical checks, and

environmental conditions are satisfactory and all Range Safety launch commit criteria are “green,” Range Safety shall provide a final approval to launch as follows: At the ER, the Chief of Safety provides approval by relaying the MFCO, “CLEAR TO LAUNCH.” At the WR, the MFCO issues a GREEN to go electronically and a verbal call “Safety is sending a green.”

1.6 RANGE SAFETY AND RANGE USER INTERFACE PROCESS

The complexity of present space programs and the inevitable cost of changes in hardware and impact on time schedules can be reduced by joint Range Safety and Range User planning. The goal of the interface process is to provide final Range Safety approvals for launch as early as possible. Range Users are strongly encouraged to solicit Range Safety participation in the development of Requests for Proposals, source selection processes, and development of contract documents such as Statements of Work and Contract Data Requirements Lists.

It is not the intent of this document or the interface process to stifle ingenuity, new technology, state-of-the-art development, or unique solutions to safety problems. Instead, the interface process ensures that both Range Safety and Range Users understand the requirements of this document and reach mutual agreement on compliance methods early in the program.

1.6.1 Range Safety Funding

Range Users and supporting agencies are responsible for full funding of activities associated with Range Safety support early in and throughout the program in accordance with funding requirements of DoDD 3200.11, AFR 80-29, AFI 99-110 at the ER and WR and 45 SWI 99-101 at the ER with the follow-on funding for each fiscal year to be received at the start of each fiscal year. Programs intending to perform launch operations at both the ER and WR shall fund both Ranges.

At the ER, Range Safety will provide cost estimates in accordance with 45 SWI 99-101 to help Range Users estimate funding requirements.

1.6.2 Initial Range Safety and Range User Technical Interchange Meeting

Range Users shall contact Range Safety to arrange an initial Technical Interchange Meeting (TIM) during the concept phase of a program. The purpose of this meeting is to present program concepts regarding flight plans; launch complex selection; launch vehicle, payload, and ground support equipment; range safety system; and facility design, operations, and launch complex safety responsibility to determine if there are any major safety concerns that could impact the program.

This TIM may occur at anytime but should be no later than the formal Program Introduction in accordance with the Universal Documentation System and, at the ER, 45 SWI 99-101. The cost of the initial interface meetings will not be charged to the Range User as long as the workload associated with this activity is insignificant in scope.

1.6.3 Tailoring Process

If desired by the Range User, Range Safety and the Range User shall jointly develop a tailored edition of this document for the program. The purpose of tailoring the document is to ensure that only applicable or alternative Range User requested equivalent requirements are levied upon the program and that Range Safety requirements are levied in the most efficient manner possible.

a. Requirements in this document are subject to tailoring within limits, including detailed design, operating, and documentation submission requirements. Details of the tailoring process can be found in Appendix 1A.

b. Tailoring, if desired, should begin at the earliest opportunity and finish no later than the critical design review.

1.6.4 Other Range Safety and Range User Technical Interchange Meetings and Reviews

Range Users and Range Safety shall jointly agree to arrange the following TIMs and reviews as necessary:

a. Flight Safety TIMs (PFDP-, FFDP-related, Chapter 2)

b. As required, combined or independent safety reviews in association with the Concept Design Review (cDR), Preliminary Design Review (PDR), and Critical Design Review (CDR) for launch vehicle, payload, and associated ground support equipment design (MSPSP-related, Chapter 3), airborne Range Safety System and associated ground support equipment design (RSSR-related, Chapter 4), critical facility design (FSDP-related, Chapter 5), and ground operations plans (GOP-related, Chapter 6)

1. cDRs shall provide design and operations detail to at least the system level.

2. PDRs shall provide design and operations detail to at least the subsystem and box level.

3. CDRs shall provide design and operating detail to the component and piece part level.

c. Hazardous and Safety Critical Procedures TIMs (Chapter 6)

d. Other TIMs, reviews, and meetings as necessary

1.6.5 Noncompliance With the Requirements

Range Users are responsible for identifying all noncompliances with this document to Range Safety for resolution. The three types of noncompliances are meets intent certifications (MICs), deviations, and waivers. Details and requirements for submitting noncompliance requests can be found in Appendix 1C.

1.6.5.1 Meets Intent Certification

MICs are used when Range Users do not meet exact EWR 127-1 requirements but do meet the intent of the requirements. Rationale for equivalent safety shall be provided. **NOTE:** MICs are normally incorporated during the tailoring process.

1.6.5.2 Deviations and Waivers

Deviations and waivers to the requirements of this document are used when the mission objectives of the Range User cannot otherwise be achieved. **NOTE 1:** Many previously approved waivers would be classified as deviations based on the definition below. **NOTE 2:** Programs using earlier editions of the document will continue to hold waiver approvals; new documentation is not required.

1.6.5.2.1 Deviations. Deviations are used when a design noncompliance is known to exist prior to

hardware production or an operational noncompliance is known to exist prior to beginning operations at the Ranges.

1.6.5.2.2 Waivers. Waivers are used when, through an error in the manufacturing process or for other reasons, a hardware noncompliance is discovered after hardware production, or an operational noncompliance is discovered after operations have begun at the Ranges.

1.6.5.2.3 Deviation and Waiver Policy.

a. It is the policy of the Ranges to avoid the use of deviations and waivers except in extremely rare situations, and they are granted only under unique and compelling circumstances. Range Safety and the Range User shall jointly endeavor to ensure that all requirements of this document are met as early in the design process as possible to limit the number of required deviations and waivers to an absolute minimum.

b. Individually, the Range Commanders have the authority to change, deviate from, or waive any requirement in this document for a specific program or mission operating at the respective launch area. Each Range Commander has the authority to accept risks that exceed those defined in Table 1-1 for a specific mission based on national or mission need.

1. Rationale for national need or mission requirements shall be explained.

2. Acceptable risk mitigation and "get well" plans shall be provided since they are an integral part of the basis for approval.

c. When granted, deviations and waivers are normally given for a defined period of time or a given number of missions until a design or operational change can be implemented.

1.6.6 System Safety Program Requirements

Range Users shall develop and maintain a System Safety Program in accordance with Appendix 1B of this Chapter. An SSPP shall be submitted to Range Safety for review and approval.

1.7 RANGE SAFETY CONCEPT TO LAUNCH PROCESS

The overall Range Safety process from "concept to launch" for new launch vehicles is shown in Figure 1-7. This process is tailorable to apply to payloads, ground support equipment, critical facilities, and/or hazardous and safety critical operations. The top

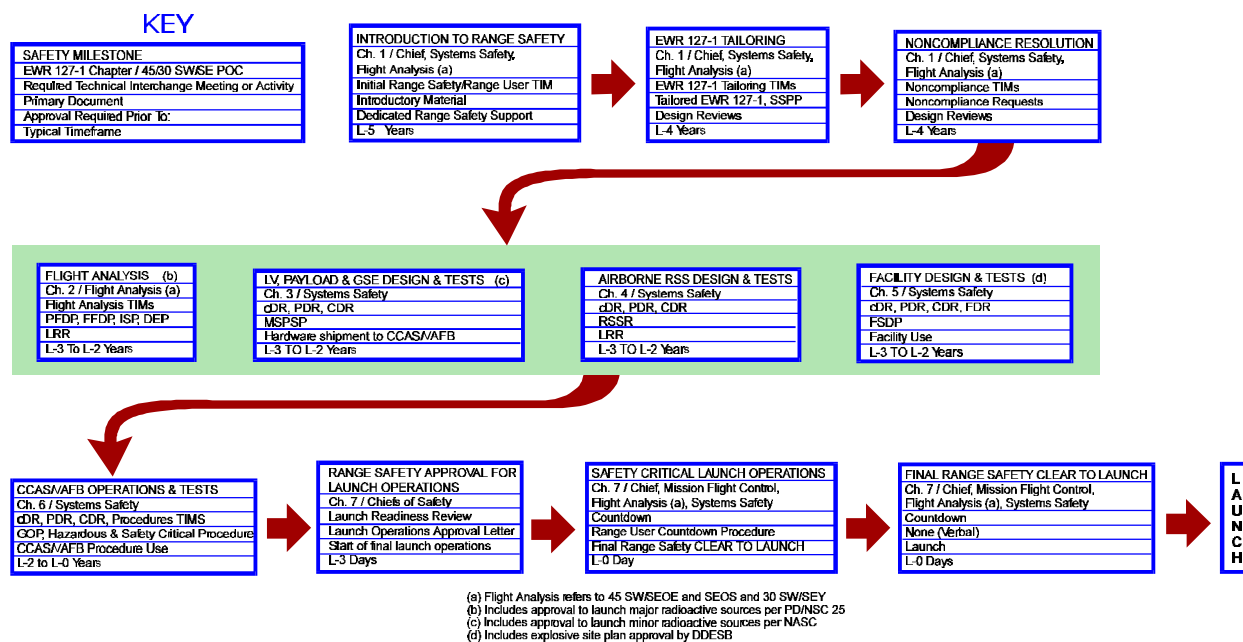


Figure 1-7
Range Safety “Concept to Launch” Process

row of boxes represents the subprocesses for establishing the program concept and applicable Range Safety requirements per this Chapter. The second row of boxes represents the subprocesses for analysis, design and test for the program per Chapters 2-5 of this document. The third row of boxes represents the subprocesses for operations and launch at the Ranges per Chapters 6 and 7 of this document. Details of the steps of this process can be found in this Chapter and Chapters 2 through 7 of this document as indicated. In addition, the Range User Handbook describes this process in greater detail. **NOTE:** Appendix 1F contains a detailed tailored version of this process specifically developed for generic payloads and payload buses.

1.7.1 Range Safety Milestones

Range Safety milestones are those events that shall occur for Range Safety to approve a program during the "concept to launch" cycle. The contents of the document, 45 SW/SE and 30 SW/SE responsibilities and authorities, required meetings and activities, documentation, and approvals, have been addressed earlier in this Chapter.

1.7.2 Time Frames and Schedules

Time frames and event schedules vary depending upon the complexity of the program. Figure 1-7 time frames provide a general schedule of events as guidance for new, major launch vehicle programs. For smaller vehicles and payloads, these time frames can be compressed to a year or less. Time frame requirements for Range Safety and the Range Users throughout the document are baselines for all programs; however, they may be altered during the tailoring process.

1.8 CHANGES TO APPROVED GENERIC SYSTEMS

a. Once baseline or generic launch systems, including launch vehicles, payloads, ground support equipment, RSSs, and critical facilities have been approved, only those systems and subsystems that change shall be submitted to Range Safety for review and approval. **NOTE 1:** The approval process remains the same as described above and is subject to the requirements in the **Situations Requiring Reevaluation of Previously Approved Programs** section of this Chapter. **NOTE 2:** Ap-

pendix 1F provides a tailored process for the approval of generic payloads.

b. Documentation shall be marked or labeled as "Mission Unique," "Upgrade," "Change," or "Other" to the previously approved system and shall be prepared in such a manner to allow easy reference to previously approved submittals.

1.9 CHANGES TO EWR 127-1

This document shall normally be updated at least once every four years; however, it may be updated once a year. If circumstances warrant, revisions may be made on a chapter-by-chapter basis within these time constraints.

a. Permanent changes to EWR 127-1 shall be performed in accordance with the requirements in Appendix 1E.

b. Changes requiring immediate attention, such as those based on a previously unknown risk or safety compromise, shall be made as necessary and distributed as EWR 127-1 Change Notices.

c. Change Notices shall be coordinated between the ER and WR, and all affected Range Users shall be notified.

1.10 INVESTIGATING AND REPORTING MISHAPS AND INCIDENTS

1.10.1 Mishaps and Incidents Involving Air Force Personnel and Resources

In accordance with AFI 91-204, the Ranges shall investigate and report all mishaps involving Air Force personnel and resources.

1.10.2 Non-Air Force Personnel and Resources

a. The ER and the WR will not report or investigate non-Air Force mishaps under AFI 91-204 aus-

pices. However, Range Safety may assist and participate in non-Air Force mishap investigations that affect or could affect operations on the Range, public safety, launch area safety, launch complex safety, or resource protection.

b. Range Safety shall be provided with the investigation results of any mishaps or incidents occurring on the Ranges.

c. Regardless of the Range User, the Range Commander may conduct formal investigations into any mishap and incident that affects or could affect public, launch area safety, or launch complex safety.

1.11 RANGE SAFETY RANGE USER HANDBOOK

A Range Safety Range User Handbook is available to all Range Users. This handbook provides informational tools to help Range Users achieve the Range Safety "concept to launch" process in the most efficient manner possible. Contact the Range Safety Office to obtain a copy or download the handbook from the Range Safety web site.

1.12 RANGE SAFETY WEB SITE

The Range Safety web site is a tool for notifying the Range User community of issues pertaining to Safety, including changes to EWR 127-1, and for distributing the various editions of 127-1. The 1997 and subsequent editions will be distributed primarily via the web site. Access is through the 45th Space Wing Home Page, "<http://www.pafb.af.mil/>". Once on the home page, clicking on "Range Safety" takes you to EWR 127-1 information. Questions and comments can be sent via e-mail to ewr1271@pafb.af.mil.

APPENDIX 1A

THE EWR 127-1 TAILORING PROCESS

1A.1 INTRODUCTION

1A.1.1 Purpose

Tailoring provides a means for formulating a specific edition of the document incorporating only those requirements that apply to a particular Range User program. A tailored version of the document is denoted as EWR 127-1 [T]. Programs that launch from only the ER or WR shall be tailored by the appropriate 45 SW/SE or 30 SW/SE section. Programs that intend to launch from both Ranges shall be tailored by a combined 45 SW/SE and 30 SW/SE team.

1A.1.2 Content

This Appendix describes the rationale for tailoring, the tailoring process, and the requirements for documenting tailored editions of the document.

1A.1.3 Applicability

The tailoring process is applicable to all programs (boosters, solid rocket motors, upper stages, payloads, associated ground support equipment and facilities). The tailoring process is optional for new programs, and existing programs where Range Safety and the Range User agree this process would be effective.

1A.1.4 Formation of a High Performance Work Team

A high performance work team (HPWT) shall be formed to perform tailoring during Technical Interchange Meetings (TIMs). HPWT Membership shall include Range User and Range Safety personnel who have specific tailoring authority.

1A.1.5 Tailoring Rationale

Tailoring shall be accomplished based on the following rationale:

1A.1.5.1 Deletion of a Requirement

a. When a requirement is not applicable to a Range User Program, the requirement shall be deleted.

b. The original paragraph number and headings shall remain, but the non-applicable text shall be removed and replaced with the abbreviation *N/A*.

1A.1.5.2 Change to a Requirement.

a. MICs may be provided by the High Performance Work Team through the change process; however, the High Performance Work Team cannot provide deviation or waivers.

b. A change is allowed to tailor the requirement to a particular system as long as the intent of the requirement is met and the equivalent level of safety is maintained.

c. The change shall be written in the place of the original requirement.

d. The existing numbering system shall remain the same to the maximum extent possible.

e. Additional paragraphs may be added; however, using the remaining unaffected paragraph numbers is not allowed.

f. All changes shall be highlighted in bold.

1A.1.5.3 Addition to a Requirement

a. An addition to a requirement is allowed when there are no existing requirements addressing new technology, when unforeseen hazards are discovered, when federal or industry standards change, and for similar reasons.

b. An addition shall be added with new paragraph numbers in the section for which it is appropriate or in a new section if no other section applies.

c. All additions shall be highlighted by underline.

1A.1.5.4 Range User Information Only

a. Requirements having only an indirect effect on the Range User but which are still required of the program as a whole shall remain in the tailored document as information only. Examples of such requirements include Operations Safety responsibilities, other Range Contractor responsibilities, and Range User facilities manager responsibilities.

b. All "Range User Information Only" requirements shall be highlighted with an asterisk prior to the affected paragraph number.

1A.1.5.5 Deviations and Waivers

Deviations and waivers are not rationale for the deletion of requirements. The requirements shall

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THE EWR 127-1 TAILORING PROCESS

remain in the EWR 127-1 [T] and the deviation and waiver process shall be used for the disposition of the requirement.

1A.1.5.6 Risk-Cost Benefit Analysis

a. Technical issues regarding such items as applicable requirements, policy, criteria, or data may be evaluated on a risk-cost benefit basis to determine if the risk is acceptable to deviate from or waive the requirements.

b. A risk-cost benefit analysis, based on the criteria defined in Figure 1-6 and Table 1-1 of this Chapter shall be submitted to Range Safety.

c. Based on risk-cost benefit analysis data, Range Safety and the Range User shall reach agreement on the disposition of the requirement in question.

d. If the application of an EWR 127-1 requirement results in significant reduction of risk at a significant cost benefit, it may be judged by Range Safety to be sufficient to impose the requirement; however, if the benefit is insignificant and/or the cost is high, the requirement may be deviated from, waived, or determined to meet the intent, all with consideration for public safety.

1A.1.6 Scheduling Technical Interchange Meetings

a. TIMs are required for Range Users to present their systems to Range Safety and to participate in the active tailoring of the document.

b. TIMs shall be scheduled as early in the program as possible when program definition is sufficient to make the meetings worthwhile and structured so that technical tailoring is completed before contractual tailoring (word smithing) is started.

c. EWR 127-1 [T] TIM data shall be provided to Range Safety at least 30 days prior to scheduled TIMs.

1A.2 TAILORING PROCESS

1A.2.1 Preparation of an Optional Draft Edition of EWR 127-1

a. If desired, the Range User and/or Range Safety may produce an optional draft edition of EWR 127-1 Tailored [T] based on conceptual data and meetings.

b. The purpose of a draft EWR 127-1 [T] is to eliminate all non-applicable requirements, leaving

only applicable requirements from which detailed tailoring can be performed.

c. The draft EWR 127-1 [T] shall be delivered as soon as possible and is negotiable.

1A.2.2 Generation of Tailoring Requests

a. EWR 127-1 [T] Tailoring Requests shall be used to document proposed EWR 127-1 [T] deletions, changes, and additions.

b. Tailoring Requests should be completed prior to scheduled TIMs and submitted to Range Safety for review or they may be completed during TIMs. **NOTE:** An example is in the Range User Range Safety Handbook.

c. The forms for submitting Tailoring Requests may be found in the Range User Handbook.

1A.2.2.1 Completing Tailoring Requests

a. The original EWR 127-1 paragraph number, original (or summarized, if sufficiently detailed) text, tailored paragraph number, proposed text, and the rationale for the change shall be included.

b. Deletions of requirements that are non-applicable and need no formal explanation may all be listed on one or more Tailoring Request forms.

c. Tailoring Requests dealing with similar or related requirements and rationale may all be combined on the same Tailoring Request form.

1A.2.2.2 Disposition of Tailoring Requests

a. If necessary, Range Safety will comment on the proposed change and dispose of it as "approved as written," "approved with provided comments," or "disapproved."

b. When agreement is reached and a Tailoring Request approved, Range Safety and Range User representatives shall sign and date the form.

1A.2.3 Publication of EWR 127-1 [T]

1A.2.3.1 Final Publication

a. The goal for final publication of an EWR 127-1 [T] is as soon as possible, but should be no later than 30 days after the PDR.

b. In some cases, it may be necessary to complete the EWR 127-1 [T] as part of the contracting process or at some other point prior to the PDR. In these cases, Range Safety will work with the Range User to establish and meet a completion

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THE EWR 127-1 TAILORING PROCESS

date for EWR 127-1 [T] publication.

1A.2.3.2 Identification of EWR 127-1 [T]

a. Each EWR 127-1 [T] shall be given a unique title and each header of each page of the EWR 127-1 [T] shall indicate the edition is a tailored edition of EWR 127-1.

b. Even page headers shall incorporate the title of the program, the edition number, and the date (EWR 127-1 Tailored for XXX Program, Edition X, Date).

c. Odd page headers shall incorporate the title of the chapter and the chapter number (East-ern and Western Range Policies and Processes, Chapter 1 [T]).

1A.2.3.3 Effectivity of EWR 127-1 [T]

a. Each EWR 127-1 [T] shall contain a preface paragraph detailing its effectivity.

b. At a minimum, the types of vehicles, the time period, and the number of vehicles to which the EWR 127-1 [T] applies shall be addressed.

1A.2.3.4 Assumptions

a. Each EWR 127-1 [T] shall contain a preface paragraph detailing the critical assumptions that were made in writing the tailored edition.

b. The nature of the assumptions shall be such that a change may invalidate the EWR 127-1 [T] or require a change or update. An example of such a critical assumption is that the design of any hazardous system does not change from that presented prior to publication of the EWR 127-1 [T].

1A.2.3.5 Management Summaries

a. Since management will be unable to review all complete editions of EWR 127-1 [T], management summaries shall be prepared to specifically identify EWR 127-1 [T] deletions, changes, and additions.

b. The management summary shall consist of all signed EWR 127-1 [T] Tailoring Requests and a list of all HPWT members.

c. A copy of the management summary and the final EWR 127-1 [T] ready for signature shall be provided to the Range Commander and the Chief of Safety for their signature.

1A.2.4 Approvals

a. Each significant addition, change, or deletion shall be signed off by the Range Safety Program manager and the appropriate Range User representative on the Tailoring Request form.

b. Tailored chapters affecting public safety (normally Chapters 1, 2, 4, and 7) shall be approved and signed by the Chief of Safety or a designated representative and the appropriate Range User representative on the Preface page of the EWR 127-1 [T].

c. Tailored chapters not affecting public safety (normally Chapters 3, 5, and 6) shall be approved and signed by the appropriate Range Safety section chief or a designated representative and the appropriate Range User representative.

d. Each complete, final EWR 127-1 [T] affecting public safety shall be approved and signed by the Wing Commander or a designated representative and the appropriate Range User representative.

1A.2.5 Revisions to EWR 127-1 [T]

a. Any revision to the document shall be evaluated against each program EWR 127-1 [T] to determine applicability.

b. Any revisions to EWR 127-1 [T] shall be made in accordance with the EWR 127-1 change process.

APPENDIX 1B

SYSTEM SAFETY PROGRAM REQUIREMENTS

1B.1 GENERAL SYSTEM SAFETY PROGRAM REQUIREMENTS

1B.1.1 System Safety Program

The Range User shall establish and maintain a system safety program to support efficient and effective achievement of overall system safety objectives.

1B.1.1.1 Management System

The Range User shall establish a safety management system to implement provisions of this document. A Range User program manager shall be responsible for the following:

- a.* Establishing, controlling, incorporating, directing, and implementing the system safety program policies
- b.* Ensuring that mishap risk is identified and eliminated or controlled within established program risk acceptability parameters.
- c.* Establishing internal reporting systems and procedures for investigation and disposition of system related mishaps and safety incidents, including potentially hazardous conditions not yet involved in a mishap or incident and reporting such matters to Range Safety
- d.* Reviewing and approving safety analyses, reports, and documentation submitted to Range Safety to establish knowledge and acceptance of residual risks.

1B.1.1.2 Key System Safety Personnel

The Range User shall establish and maintain a key system safety position for each program. The individual in this position shall be directly responsible to the Range User program manager for safety matters. At a minimum, Range User safety personnel shall be responsible for the following:

- a.* Reviewing and approving safety analyses, reports, and documentation submitted to Range Safety.
- b.* Reviewing and approving all hazardous and safety critical test plans and procedures conducted at the Ranges and verifying that all safety requirements are incorporated.

1B.1.1.3 Compliance

Compliance with all contractually imposed re-

quirements of this document is mandatory. When a requested system safety program plan is approved by Range Safety, it provides a basis of understanding between the Range User and Range Safety as to how the system safety program will be accomplished. Any noncompliance must be requested by the Range User and approved by Range Safety.

1B.1.1.4 Conflicting Requirements

When conflicting requirements or deficiencies are identified in system safety program requirements or with other program requirements, the Range User shall submit notification, with proposed solutions or alternatives and supporting rationale, to Range Safety for resolution.

1B.1.1.5 System Safety Precedence

The order of precedence for satisfying system safety requirements and resolving identified hazards shall be as follows:

- a.* Design for minimum risk. From the first, design to eliminate hazards. If an identified hazard cannot be eliminated, reduce the associated risk to an acceptable level, as defined by Range Safety, through design selection.
- b.* Incorporate safety devices. If identified hazards cannot be eliminated or their associated risk adequately reduced through design selection, that risk shall be reduced to a level acceptable to Range Safety through the use of fixed, automatic, or other protective safety design features or devices. Provisions shall be made for periodic functional checks of safety devices when applicable.
- c.* Provide warning devices. When neither design nor safety devices can effectively eliminate identified hazards or adequately reduce associated risk, devices shall be used to detect the condition and to produce an adequate warning signal to alert personnel of the hazard. Warning signals and their application shall be designed to minimize the probability of incorrect personnel reaction to the signals and shall be standardized within like types of systems.
- d.* Develop procedures and training. Where it is impractical to eliminate hazards through design selection or adequately reduce the associated risk with safety and warning devices, procedures and training shall be used. However, without a specific

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deviation or waiver from Range Safety, no warning, caution, or other form of written advisory shall be used as the only risk reduction method for Category I or II hazards (per Chapter 1 Table 1-1). Procedures may include the use of personal protective equipment. Precautionary notations shall be standardized as specified by Range Safety. Tasks and activities judged to be safety critical by Range Safety require certification of personnel proficiency.

1B.1.1.6 Risk Assessment

Decisions regarding resolution of identified hazards shall be based on assessment of the risk involved. To aid the achievement of the objectives of system safety, hazards shall be characterized as to hazard severity categories and hazard probability levels, when possible. Since the priority for system safety is eliminating hazards by design, a risk assessment procedure considering only hazard severity, will generally suffice during the early design phase to minimize risk. When hazards are not eliminated during the early design phase, a risk assessment procedure based upon the hazard probability, hazard severity, as well as risk impact, shall be used to establish priorities for corrective action and resolution of identified hazards.

1B.1.2 Task 1: Establish a System Safety Program

The purpose of this task is to establish the foundation for a system safety program. The requirements for Task 1 are as follows:

- a.* Establish and execute a system safety program that meets the tailored requirements of this document.
- b.* Develop a planned approach for safety task accomplishment, provide qualified people to accomplish the tasks, establish the authority for implementing the safety tasks through all levels of management, and allocate appropriate resources, both manning and funding, to ensure the safety tasks are completed.
- c.* Establish a system safety organization or function and lines of communication within the program organization and with associated organizations (government and contractor).
- d.* Establish interfaces between system safety and other functional elements of the program, as well as

between other safety disciplines such as nuclear, range, explosive, chemical, and biological.

- e.* Designate the organizational unit responsible for executing each safety task.

- f.* Establish the authority for resolution of identified hazards.

- g.* Define system safety program milestones and relate these to major program milestones, program element responsibility, and required inputs and outputs.

- h.* Establish an incident alert and notification, investigation and reporting process, to include notification of Range Safety.

1B.1.3 Task 2: Develop a System Safety Program Plan

The purpose of this task is to develop a System Safety Program Plan (SSPP). The SSPP shall describe in detail tasks and activities of system safety management and system safety engineering required to identify, evaluate, and eliminate and control hazards, or reduce the associated risk to a level acceptable to Range Safety throughout the system life cycle. The approved plan provides a formal basis of understanding between the Range User and Range Safety on how the SSPP will be conducted to meet the requirements of EWR 127-1, including general and specific provisions. The approved plan shall account for all contractually required tasks and responsibilities on an item-by-item basis. The Range User shall submit a draft SSPP to Range Safety for review and approval within 45 days of contract award and a final at least 45 days prior to any program cDR. The SSPP shall include the following information:

1B.1.3.1 System Safety Organization

The System Safety Organization section shall describe the following:

- a.* The system safety organization or function within the organization of the total program using charts to show the organizational and functional relationships and lines of communication
- b.* The organizational relationship between other functional elements having responsibility for tasks with system safety impacts and the system safety management and engineering organization
- c.* Review and approval authority of applicable tasks by system safety

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d. The responsibility and authority of system safety personnel, other Range User organizational elements involved in the system safety effort, contractors, and system safety groups

e. A description of the methods by which safety personnel may raise issues of concern directly to the program manager or the program manager's supervisor within the organization

f. Identification of the organizational unit responsible for executing each task

g. Identification of the authority in regard to resolution of all identified hazards

h. The staffing of the system safety organization for the duration of the program to include personnel loading and a summary of the qualifications of key system safety personnel assigned to the effort, including those who possess coordination and approval authority for Range User prepared documentation

i. The process by which Range User management decisions will be made, including such decisions as timely notification of unacceptable risks, necessary action, incidents, or malfunctions, waivers to safety requirements, program deviations

j. Details of how resolution and action relative to system safety will be accomplished at the program management level possessing resolution authority

1B.1.3.2 System Safety Program Milestones

The SSPP shall:

a. Define system safety program milestones and relate these to major program milestones, program element responsibility, and required inputs and outputs

b. Provide a program schedule of safety tasks, including start and completion dates, reports, and reviews

c. Identify subsystem, component, software safety activities as well as integrated system level activities such as design analyses, tests, and demonstrations applicable to the system safety program but specified in other engineering studies and development efforts to preclude duplication

1B.1.3.3 System Safety Data

The SSPP shall:

a. Identify deliverable data by title, number, and means of delivery such as hard copy, electronic

b. Identify non-deliverable system safety data and describe the procedures for accessibility by Range Safety and retention of data of historical value

1B.1.3.4 System Safety Interfaces

The SSPP shall identify, in detail:

a. The interface between system safety and all other applicable safety disciplines such as: nuclear safety, Range Safety, explosive and ordnance safety, chemical and biological safety, laser safety, and any others

b. The interface between system safety, systems engineering, and all other support disciplines such as maintainability, quality control, reliability, software development, human factors engineering, medical support (health hazard assessments), and any others

c. The interface between system safety and all system integration and test disciplines

1B.1.4 Task 3: Establish System Safety Program Reviews and Audits

The purpose of this task is to establish a system safety program review and audit program as specified by Range Safety. This task is also used to acquire support for special requirements such as certifications and test and flight readiness reviews. The following tasks shall be performed:

a. Conduct, document, and make documentation available to Range Safety upon request the following reviews and audits:

1. The Range User system safety program
2. Associate contractor system safety programs

3. Support contractor system safety programs
4. Subcontractor system safety programs

b. Provide the support for the following:

1. Safety reviews and audits performed by representatives of Range Safety

2. Presentations to government certifying activities such as phase safety reviews, munitions safety boards, nuclear safety boards, or flight safety review boards to the extent specified by this document. **NOTE:** These may also include special reviews such as flight and article readiness reviews or pre-construction briefings.

3. Safety reviews shall be held in association

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with program cDR, PDR, and CDRs. Generally, the safety reviews shall address the following:

- a) Program systems and operations overview
- b) Presentation of Range Safety required documentation
- c) EWR 127-1 Noncompliances
- d) Open safety issues

1B.1.5 Task 4: Track Hazards and Risk Resolution

The purpose of this task is to establish a single closed-loop hazard tracking system by development of a method or procedure to document and track hazards and their controls, providing an audit trail of hazard resolutions. A centralized file, computer database, or document called a *Hazard Log* shall be maintained and made available to Range Safety upon request. At a minimum, the Hazard Log shall contain the following information:

- a. Description of each hazard, including an associated hazard risk index
- b. Status of each hazard and control
- c. Traceability of resolution on each Hazard Log item from the time the hazard was identified to the time the risk associated with the hazard was reduced to a level acceptable to Range Safety
- d. Identification of residual risk
- e. Action persons and organizational element
- f. The recommended controls to reduce the hazard to a level of risk acceptable to Range Safety
- g. The signature of Range Safety accepting the risk effecting closure of the Hazard Log item

1B.2 HAZARD ANALYSIS AND RISK RESOLUTION

NOTE: The Range User shall perform all of the required Preliminary Hazard Analyses (PHAs), Subsystem Hazard Analyses (SSHAs), System Hazard Analyses (SHAs), Operating and Support Hazard Analyses (O&SHAs) and Safety Assessments per Tasks 1 through 8 that follow; however, the Range User shall submit to Range Safety only those Hazard Analyses and Safety Assessments as specifically required per the Data Requirements sections of Chapters 3, 4, 5, and 6 of this document.

1B.2.1 Task 1: Perform and Document A Preliminary Hazard Analysis

The purpose of this task is to perform and document a Preliminary Hazard Analysis (PHA) to identify safety critical areas, to provide an initial assessment of hazards, and to identify requisite hazard controls and follow-on actions. The Range User shall perform and document a PHA to obtain an initial risk assessment of a concept or system. Based on the best available data, including mishap data from similar systems and other lessons learned, hazards associated with the proposed design or function shall be evaluated for hazard severity, hazard probability, and operational constraint. Safety provisions and alternatives needed to eliminate hazards or reduce their associated risk to a level acceptable to Range Safety shall be included. At a minimum, the PHA shall consider the following for identification and evaluation of hazards:

- a. Hazardous components such as fuels, propellants, lasers, explosives, toxic substances, hazardous construction materials, pressure systems, and other energy sources

- b. Safety related interface considerations among various elements of the system such as material compatibility, electromagnetic interference, inadvertent activation, fire and explosive initiation and propagation, and hardware and software controls. **NOTE:** This shall include consideration of the potential contribution by software, including software developed by other contractors and sources, to subsystem and system mishaps.

- c. Safety design criteria to control safety-critical software commands and responses such as inadvertent command, failure to command, untimely command or responses, inappropriate magnitude, or designated undesired events shall be identified and appropriate action taken to incorporate them in the software and related hardware specifications.

- d. Environmental constraints including the operating environments such as drop, shock, vibration, extreme temperatures, humidity, noise, exposure to toxic substances, health hazards, fire, electrostatic discharge, lightning, electromagnetic environmental effects, ionizing and non-ionizing radiation including laser radiation

- e. Operating, test, maintenance, built-in-tests, diagnostics, and emergency procedures (human factors engineering, human error analysis of op-

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erator functions, tasks, and requirements; effect of factors such as equipment layout, lighting requirements, potential exposures to toxic materials, effects of noise or radiation on human performance; explosive ordnance render safe and emergency disposal procedures; life support requirements and their safety implications in manned systems, crash safety, egress, rescue, survival, and salvage)

f. Those test unique hazards that will be a direct result of the test and evaluation of the article or vehicle

g. Facilities, real property installed equipment, support equipment such as provisions for storage, assembly, checkout, Proof testing of hazardous systems and assemblies that may involve toxic, flammable, explosive, corrosive or cryogenic materials and wastes; radiation or noise emitters; electrical power sources

h. Training and certification pertaining to hazardous and safety critical operations and maintenance of hazardous and safety critical systems

i. Safety related equipment, safeguards, and possible alternate approaches such as interlocks; system redundancy; fail safe design considerations using hardware or software controls; subsystem protection; fire detection and suppression systems; personal protective equipment; heating, ventilation, and air-conditioning; and noise or radiation barriers

j. Malfunctions to the system, subsystems, or software. **NOTE:** Each malfunction shall be specified, the cause and resulting sequence of events determined, the degree of hazard determined, and appropriate specification and/or design changes developed.

1B.2.2 Task 2: Perform and Document Subsystem Hazard Analyses

The purpose of this task is to perform and document a Subsystem Hazard Analysis (SSHA) to verify subsystem compliance with safety requirements contained in subsystem specifications and other applicable documents; identify previously unidentified hazards associated with the design of

subsystems including component failure modes, critical human error inputs, and hazards resulting from functional relationships between components and equipment comprising each subsystem; and recommend actions necessary to eliminate identified hazards or control their associated risk to acceptable levels. The Range User shall perform and document an SSHA to identify all components and equipment that could result in a hazard or whose design does not satisfy contractual safety requirements. This will include government furnished equipment, non-developmental items, and software. Areas to consider are performance, performance degradation, functional failures, timing errors, design errors or defects, or inadvertent functioning. The human shall be considered a component within a subsystem, receiving both inputs and initiating outputs, during the conduct of this analysis. The analysis shall include a determination of the following:

a. The modes of failure including reasonable human errors as well as single point and common mode failures, and the effects on safety when failures occur in subsystem components

b. The potential contribution of hardware and software, including that which is developed by other contractors and sources, events, faults, and occurrences such as improper timing on the safety of the subsystem

c. That the safety design criteria in the hardware, software, and facilities specifications have been satisfied

d. That the method of implementation of hardware, software, and facilities design requirements and corrective actions has not impaired or decreased the safety of the subsystem nor has it introduced any new hazards or risks

e. The implementation of safety design requirements from top level specifications to detailed design specifications for the subsystem. **NOTE:** The implementation of safety design requirements developed as part of the PHA shall be analyzed to ensure that it satisfies the intent of the requirements.

f. Test plan and procedure recommendations to integrate safety testing into the hardware and software test programs

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g. That system level hazards attributed to the subsystem are analyzed and that adequate control of the potential hazard is implemented in the design

1B.2.2.1 SSHA Analysis Techniques

If no specific analysis techniques are directed or if Range User recommends that a different technique than specified by Range Safety should be used, the Range User shall obtain approval of techniques to be used prior to performing the analysis.

1B.2.2.2 SSHA Software

a. When software to be used in conjunction with the subsystem is being developed under MIL-STD-498 or MIL-STD-1679 or other development documents; the Range User performing the SSHA shall monitor, obtain, and use the output of each phase of the formal software development process in evaluating the software contribution to the SSHA.

b. Problems identified that require the reaction of the software developer shall be reported to Range Safety in time to support the ongoing phase of the software development process.

1B.2.2.3 Updating the SSHA

The Range User shall update the SSHA as a result of any system design changes, including software design changes, that affect system safety.

1B.2.3 Task 3: Perform and Document System Hazard Analyses

The purpose of this task is to perform and document a System Hazard Analysis (SHA) to verify system compliance with safety requirements contained in system specifications and other applicable documents; identify previously unidentified hazards associated with the subsystem interfaces and system functional faults; assess the risk associated with the total system design, including software, and specifically of the subsystem interfaces; and recommend actions necessary to eliminate identified hazards and/or control their associated risk to acceptable levels.

The Range User shall perform and document a system hazard analysis to identify hazards and assess the risk of the total system design, including software, and specifically of the subsystem inter-

faces. This analysis shall include a review of subsystem interrelationships to determine the following:

a. Compliance with specified safety design criteria

b. Possible independent, dependent, and simultaneous hazardous events including system failures; failures of safety devices; common cause failures and events; and system interactions that could create a hazard or result in an increase in mishap risk

c. Degradation in the safety of a subsystem or the total system from normal operation of another subsystem

d. Design changes that affect subsystems

e. Effects of reasonable human errors

f. Potential contribution of hardware and software, including that which is developed by other Range Users and other sources or commercial off-the-shelf hardware or software, events, faults and occurrences such as improper timing on the safety of the system.

g. That the safety design criteria in the hardware, software, and facilities specifications have been satisfied

h. That the method of implementation of the hardware, software, and facilities design requirements and corrective actions has not impaired or degraded the safety of the system nor has introduced any new hazards

1B.2.3.1 SHA Analysis Techniques

If no specific analysis techniques are directed or if Range User recommends that a different technique than specified by Range Safety should be used, the Range User shall obtain approval of techniques to be used prior to performing the analysis. The SHA may be combined with and/or performed using similar techniques to those used for the SSHA.

1B.2.3.2 SHA Software

a. When software to be used in conjunction with the system is being developed under DoD-STD-2167 and DoD-STD-2168; or MIL-STD-1679 or other development documents; the Range User performing the SHA shall monitor, obtain, and use the output of each phase of the formal software development process in evaluating the software contribution to the SSHA.

b. Problems identified that require the reaction of

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the software developer shall be reported to Range Safety in time to support the ongoing phase of the software development process.

1B.2.3.3 Updating the SHA

The Range User shall update the SHA as a result of any system design changes, including software design changes, that affect system safety.

1B.2.4 Task 4: Perform and Document Operating and Support Hazard Analyses

The purpose of this task is to perform and document Operating and Support Hazard Analysis (O&SHA) to evaluate activities for hazards or risks introduced into the system by operational and support procedures and to evaluate adequacy of operational and support procedures used to eliminate, control, or abate identified hazards or risks.

The Range User shall perform and document an O&SHA to examine procedurally controlled activities. The O&SHA identifies and evaluates hazards resulting from the implementation of operations or tasks performed by persons, considering the following criteria: the planned system configuration and/or state at each phase of activity; the facility interfaces; the planned environments or the ranges thereof; the supporting tools or other equipment, including software controlled automatic test equipment, specified for use; operational and/or task sequence, concurrent task effects and limitations; biotechnological factors, regulatory or contractually specified personnel safety and health requirements; and the potential for unplanned events including hazards introduced by human errors. The human shall be considered an element of the total system, receiving both inputs and initiating outputs during the conduct of this analysis.

The O&SHA shall identify the safety requirements or alternatives needed to eliminate or control identified hazards or to reduce the associated

risk to a level that is acceptable under either regulatory or Range Safety specified criteria. The analysis shall identify the following:

a. Activities that occur under hazardous conditions, their time periods, and the actions required to minimize risk during these activities and time periods

b. Changes needed in functional or design requirements for system hardware and software, facilities, tooling, or support and test equipment to eliminate or control hazards or reduce associated risks

c. Requirements for safety devices and equipment, including personnel safety and life support equipment

d. Warnings, cautions, and special emergency procedures such as egress, rescue, escape, render safe, explosive ordnance disposal, and back-out, including those necessitated by failure of a computer software-controlled operation to produce the expected and required safe result or indication

e. Requirements for packaging, handling, storage, transportation, maintenance, and disposal of hazardous materials

f. Requirements for safety training and personnel certification

g. Effects of non-developmental hardware and software across the interface with other system components or subsystems

h. Potentially hazardous system states under operator control

1B.2.4.1 Assessment of Procedures

The O&SHA shall document system safety assessment of procedures involved in: system production, deployment, installation, assembly, test, operation, maintenance, servicing, transportation, storage, modification, demilitarization, and disposal.

1B.2.4.2 O&SHA Analysis Techniques

If no specific analysis techniques are directed or if the Range User recommends that a different technique than specified by Range Safety should be used, the Range User shall obtain approval of techniques to be used prior to performing the analysis.

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1B.2.4.3 Updating the O&SHA

The Range User shall update the O&SHA as a result of any system design or operational changes.

1B.2.5 Task 5: Perform and Document Safety Assessments

The purpose of this task is to perform and document a comprehensive evaluation of the mishap risk being assumed prior to test or operation of a system. The Range User shall perform and document a safety assessment to identify all safety features of the hardware, software, and system design and to identify procedural, hardware and software related hazards that may be present in the system being acquired including specific procedural controls and precautions that should be followed. The safety assessment shall summarize the following information:

a. The safety criteria and methodology used to classify and rank hazards, plus any assumptions on which the criteria or methodologies were based or derived including the definition of acceptable risk as specified by Range Safety

b. The results of analyses and tests performed to identify hazards inherent in the system, including:

1. Those hazards that still have a residual risk and the actions that have been taken to reduce the associated risk to a level contractually specified as acceptable

2. Results of tests conducted to validate safety criteria, requirements and analyses

c. The results of the safety program efforts., including a list of all significant hazards along with specific safety recommendations or precautions required to ensure safety of personnel, property, or the environment. **NOTE:** The list shall be categorized as to whether or not the risks may be expected under normal or abnormal operating conditions.

d. Any hazardous materials generated by or used in the system

e. Conclusion with a signed statement that all identified hazards have been eliminated or their associated risks controlled to levels contractually

specified as acceptable, and that the system is ready to test or operate or proceed to the next acquisition phase

f. Recommendations applicable to hazards at the interface of Range User systems with other systems, as required

1B.2.6 Task 6: Perform and Document Engineering Change Proposals, Specification Change Notices, Software Problem Reports, Program or Software Trouble Reports, and Requests

The purpose of this task is to perform and document analyses of Engineering Change Proposals (ECPs), Specification Change Notices (SCNs), Software Problem Reports (SPRs), program or software trouble reports (PTRs, STRs), and requests for deviation or waiver to determine the safety impact on the system.

1B.2.6.1 Engineering Change Proposals

As specified by Range Safety, the Range User shall analyze each ECP to determine the hazards associated with it, assess the associated risk, and predict the safety impact of the ECP on the existing system. The Range User shall notify Range Safety when an ECP changes the level of safety of the existing system.

1B.2.6.2 Specification Change Notices

The Range User shall analyze each SCN to determine the potential effect on safety critical components or subsystems. The Range User shall notify Range Safety if the level of safety of the system changes.

1B.2.6.3 Software Problem Reports

The Range User shall review each SPR to determine the potential safety implications. If safety impacts are identified, the Range User shall notify Range Safety of a decrease in the level of safety of the system.

1B.2.6.4 Program or Software Trouble Reports

The Range User shall review each PTR and STR to determine the potential safety implications. If

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safety impacts are identified, the Range User shall notify Range Safety of a decrease in the level of safety of the system.

1B.2.7 Task 7: Perform and Document Compliance With Safety Requirements

The purpose of this task is to define and perform tests and demonstrations or use other verification methods on safety critical hardware, software, and procedures to verify compliance with safety requirements.

The Range User shall define and perform tests, demonstrations, develop models, and otherwise verify the compliance of the system with safety requirements on safety critical hardware, software, and procedures. Induced or simulated failures shall be considered to demonstrate the acceptable safety performance of the equipment and software.

Where hazards are identified during the development efforts and analysis or inspection cannot determine the adequacy of actions taken to reduce the risk, safety tests shall be specified and conducted to evaluate the overall effectiveness of the actions taken. SSPPs and test plan and procedure documents shall be revised to include these tests.

Where costs for safety testing would be prohibitive, safety characteristics or procedures may be verified by engineering analyses, analogy, laboratory test, functional mockups, or models and simulations when approved by Range Safety. Specific safety tests shall be integrated into appropriate system test and demonstration plans, including verification and validation plans, to maximum extent possible.

Test plans, test procedures, and the results of all tests including design verification, technical operational evaluation, technical data and requirements validation and verification, production acceptance, and shelf-life validation shall be reviewed to ensure:

a. Safety of the design, including operating and maintenance procedures, is adequately demonstrated, including verification of such items as safety devices and warning devices for all catastrophic hazards not eliminated by design. Critical, marginal, and negligible hazards shall also be addressed as required by Range Safety.

b. Results of safety evaluations of the system are included in the test and evaluation reports on hardware or software.

1B.2.8 Task 8: Perform and Document Compliance with Applicable Codes

The purpose of this task is to perform and document an assessment to identify and verify compliance with military, federal, national, international, and industry codes to ensure safe design of a system, and to comprehensively evaluate the safety risk being assumed prior to test or operation of a system or at contract completion.

The Range User shall perform and document a safety compliance assessment to identify and document compliance with appropriate design and operational safety requirements. The assessment identifies the contractually imposed standards, specifications, and codes appropriate to the safety of the system and documents compliance with these requirements.

The assessment includes necessary hazard analysis, design drawing and procedural reviews, and equipment inspections. The assessment shall incorporate the scope and techniques of the PHA, SSHA, SHA, and O&SHA to the extent necessary to ensure the safe design, operation, maintenance, and support of the system. A safety compliance assessment shall include the following:

a. Identification of military, federal, national, international, and industry safety specifications, standards, and codes applicable to the system and documentation of compliance of the design and procedures with these requirements

b. Identification of other military, federal, national, international, and industry safety specifications, standards, and codes applicable to the system, that are required by law or the use thereof is considered good engineering practice, and documentation of compliance of the design and procedures with these requirements

c. Identification and evaluation of residual hazards inherent in the system or that arise from system unique interfaces, installation, test, operation, maintenance, or support

d. Identification of necessary specialized safety design features, devices, procedures, skills, train-

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ing, facilities, support requirements, and personnel protective equipment

e. Identification of hazardous materials and justification for using such a material instead of a less

or non-hazardous material and the precautions and procedures necessary for safe storage, hand-ling, transport, use, and disposal of material.

APPENDIX 1C

SUBMITTING EWR 127-1 NONCOMPLIANCE REQUESTS

1C.1 INTRODUCTION

1C.1.1 Purpose

Meets intent certifications (MICs), deviations, and waivers are used when Range Users can not meet or feel that they can meet equivalent, though not the exact requirements of the document.

1C.1.2 Content

This Appendix describes the noncompliance categories and the process for submitting MICs, deviations, and waivers.

1C.1.3 Applicability

a. The noncompliance process is applicable to all programs including boosters, solid rocket motors, upper stages, payloads, ground support equipment, facilities, and others that operate at the Ranges or elsewhere if governed under Range personnel unless grandfathered in accordance with the criteria stated below.

b. The noncompliance process is also applicable to all programs regardless of which version of the old Range Safety Standards (such as AFETR 127-1, ESMCR 127-1, ERR 127-1, WSMCR 127-1, and WRR 127-1) is under contract.

c. The flight plan approval process does not fall within the intent of this Appendix except when it involves launch vehicle and/or payload hardware.

1C.1.4 Grandfathering Criteria

Previously approved systems with or without granted MICs, deviations, and waivers will be grandfathered and maintain approval and need not be resubmitted unless it is determined by the Chief of Safety and/or the Range User that one of the following situations exists:

a. Existing programs make major modifications or include the use of currently approved components, systems, or subsystems in new application (through tailoring if desire) *Exception: Previously approved existing components, systems, or subsystems that do not increase the risks, do not degrade safety, or can survive new environments are equivalent to or lower than the originally approved qualification levels shall be honored and do not have to meet new requirements as long as data and analyses show that the criteria have been met.*

b. The Range User has determined that it is economically and technically feasible to incorporate new requirements into the system.

c. The system has been or will be modified to the extent that it is considered a new program or that existing safety approvals no longer apply. **NOTE:** Risk and hazard analyses developed jointly by Range Safety and the Range User shall be used to determine applicability of the safety approvals.

d. A previously unforeseen or newly discovered safety hazard exists that is deemed by either Range Safety or the Range User to be significant enough to warrant the change.

e. The system does not meet the requirements existing when the system was originally accepted. **NOTE:** This category includes systems that were previously approved, but when obtaining the approval, the noncompliances to the original requirement were not identified.

f. A system or procedure is modified and a new requirement reveals that a significant risk exists.

g. Accident and incident investigations and reports may dictate compliance with the document.

1C.1.5 Noncompliance Categories

1C.1.5.1 Public Safety

Public safety noncompliance deals with safety requirements involving risks to the general public of the US or foreign countries and/or their property.

1C.1.5.2 Launch Area Safety

Launch area safety noncompliances deal with safety requirements involving risks that is limited to personnel and/or property on CCAS and may be extended to KSC, and VAFB. Launch area safety involves multiple commercial users, government tenants, or squadron commanders.

1C.1.5.3 Launch Complex Safety

Launch complex safety noncompliances deal with safety requirements involving risk that is limited to the personnel and/or property under the control of a single commercial user, full time government tenant organization, or USAF squadron/detachment commander (control authority). Launch complex safety is limited to risks confined to a

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SUBMITTING EWR 127-1 NONCOMPLIANCE REQUESTS

physical space for which the single control authority is responsible.

1C.1.6 Effectivity of Noncompliances

1C.1.6.1 Lifetime

a. Lifetime deviations and waivers are undesirable and shall be limited to those situations where it is virtually impossible to meet the requirement or meet the intent of the requirement.

b. Lifetime MICs are allowed provided equivalent safety is maintained.

1C.1.6.2 Time Limited

a. Time limited deviations and waivers are set for a limited period of time or a limited number of launches. The time constraint is normally determined as a function of cost, impact on schedule, and the minimum time needed to satisfactorily modify or replace the non-compliant system or to modify the non-compliant operation.

b. MICs may be time limited depending on the method by which equivalent safety is accomplished. If excessive procedural controls, personnel, material, or costs are required to maintain equivalent safety, the MIC should be time limited.

1C.1.7 Conditions for Issuance of Deviations, MICs, and Waivers

a. Hazard Mitigation. All reasonable steps shall be taken to meet the intent of the document requirements and mitigate associated hazards to acceptable levels, including design and operational methods.

b. Get Well Plans. All deviations, MICs, and waivers that are not granted for the life of a program shall have a plan to meet the requirements in question by the time the approved effectivity expires.

1C.1.8 Risk-Cost Benefit Analysis

a. Technical disagreements regarding such items as applicable requirements, policy, criteria, or data may be evaluated on a risk-cost benefit basis to determine if the risk is acceptable to delete, modify, deviate from, or waive the requirements.

b. Risk-cost benefit analyses based on the criteria defined in Tables 1-1 and 1-2 of this Chapter shall be submitted to Range Safety.

c. Based on risk-cost benefit analysis data, Range Safety and the Range User shall reach agreement on the disposition of the requirement in question.

d. If the application of an EWR 127-1 requirement results in a significant reduction of risk at a significant cost benefit, it may be judged by Range Safety to be sufficient to impose the requirement; however, if the benefit is insignificant and/or the cost is high, the requirement may be deviated from, waived, or determined to meet the intent, all with consideration for public safety.

1C.2 SUBMITTING NONCOMPLIANCES

1C.2.1 Format

All noncompliances shall be submitted in writing in letter or memorandum format or the equivalent. An example format may be found in the Range User Handbook.

1C.2.2 Content

The following items shall be included in the letter or memorandum:

- a.* Title: MIC, Deviation, Waiver of (requirement a) for (requirement b)
- b.* Descriptive Title of MIC, Deviation, Waiver request
- c.* MIC, Deviation, Waiver category
- d.* MIC, Deviation, Waiver effectivity
- e.* Background
 1. Summary of Range Safety requirement
 2. Statement of the noncompliance
 3. Reason for request
- f.* Conditions for MIC, Deviation, Waiver
 1. Hazard mitigation
 2. Get Well Plan

1C.2.3 Process

a. Requests for MICs, deviations, and waivers shall be submitted to the Office of the Chief of Safety as early as they are known to be necessary.

b. Public safety MICs, deviations, and waivers such as those including flight plan approval, flight termination system design, and toxic propellant storage normally require extensive risk analyses that can take one to two years to perform; therefore, these deviations, MICs, and waivers shall be initiated during the planning phase and be closed

APPENDIX 1C

SUBMITTING EWR 127-1 NONCOMPLIANCE REQUESTS

out by Range Safety approval or design change prior to manufacture of the booster, spacecraft, flight termination system or other system in question.

c. Launch site safety and launch complex safety MICs, deviations, and waivers normally require two weeks to two months to process depending on the nature of the noncompliance and the requested effectivity.

1C.2.4 Approvals

a. Programs launching from only the ER or WR require only the appropriate 45 SW/SE or 30 SW/SE approvals.

b. Programs launching from both Ranges require approvals from 45 SW/SE and 30 SW/SE.

c. Waivers and deviations dealing with public safety shall be approved by the Wing Commanders or their designated representatives.

d. Waivers and deviations other than public safety shall be approved by the Chiefs of Safety or their designated representatives.

e. MICs shall be approved by appropriate 45 SW/SE or 30 SW/SE section chiefs or their designated representatives.

APPENDIX 1D

EWR 127-1 ACCEPTABLE RISK CRITERIA

1D.1 INTRODUCTION

a. The criteria defined in this Appendix is formulated to meet the requirements of PL 60 and apply to all programs and missions operating at the Ranges.

b. All programs and missions are subject to GO/NO-GO decisions based on risk acceptance. The overall risk levels may or may not be an additive value that includes risks resulting from debris, toxic, and blast overpressure exposures. Risk guidance levels in the **Launch Area Safety** and **Launch Complex Safety** sections of this Chapter are derived from the criteria shown in Table 1D-1.

c. These risk guidance levels are provided as guidance for the Wing Commanders and as planning information for Range Users.

d. Range Users should use this guidance to develop their program or mission plans to minimize risk levels.

1D.2 DESCRIPTION OF RISK CRITERIA

a. As shown in Table 1D-1, comparing normally accepted public, day-to-day accident risk exposure to normal launch vehicle and payload launch operating risks indicates that, under any circumstances, the annual collective risk for launch operations is small.

b. A ratio of $1 \times 10^{-3} / 1.8 \times 10^{-4} = 5.7 \times 10^{-8}$ is obtained between the maximum annual launch risks accepted under the guidance limits and the total annual launch risk. Therefore, launch operations risks are only this fraction of the normally accepted risk levels defined in the **Public Safety** section of this document.

c. Individual hazardous activities may exceed guidance levels based on national need or mission requirements. Deviations, meets intent certifications, or waiver requests are required.

Table 1D-1
Comparison of Various Normally Accepted Public Ambient Collective Accident Risks
with Collective ER and WR Launch Risk Guides

Hazardous Events	Average US Individual Casualty Risk per Year	Collective Casualty Risk per Year for Population in ER and WR Launch Area ^a	Equivalent Launch Collective Casualty Risk per Year	Launch Guidance Limits: Collective Casualty Risks per Launch
All Accidents	7.2×10^{-2} ^b	1.8×10^{-4}		
Motor Vehicle Accidents	8.0×10^{-3} ^b	2.0×10^{-3}		
Air Travel Accidents	6.4×10^{-4} ^c	1.6×10^{-2}		
Natural Hazards ^d	2.6×10^{-4} ^e	6.5×10^{-1}		
Hypothetical Nuclear Plant Accident	4.0×10^{-6} ^e	1.0		
Aviation Over flight Accidents		1.8×10^{-2} ^f		
Maximum Risk Acceptable ^g for Accident in One-Time National Need Launch			1×10^{-2}	3×10^{-4} ^h
Maximum Risk Acceptable ^g for Accidents in Launches Unless High Management Review			1×10^{-3}	3×10^{-5} ⁱ

Notes: ^a Total population of 2.5×10^5 assumed exposed to ER or WR launch area Accidents.

^b From total numbers of casualties (at least one-day disability) in *Accident Facts*, 1994, a publication of the National Safety Council, divided by US population of 2.5×10^8

^c From number of fatalities in *Accident Facts*, 1994, multiplied by 200, approximately the average number of casualties (at least one-day disability) experienced in the US for each accident fatality experienced.

^d Lightning, tornadoes, hurricane (earthquake negligible)

^e From *Reactor Safety Study*, WASH-1400/NUREG-75/014, 1975.

^f From Philipson, Lloyd L., *Refined Estimate of the Risk from Aviation Accidents to the Population in the CCAS Area of Concern*, ACTA Inc., Report No. 94-297/46-01, September 1994. (Estimates derived for the ER; assumed to be applicable to the WR as well)

^g Waiver or Deviation Required.

^h At most one such launch per year assumed.

ⁱ From Risk Commonality/Acceptability Workshop, August 1990.

APPENDIX 1E

MAKING CHANGES TO EWR 127-1

1E.1 INTRODUCTION

1E.1.1 Purpose

Changing the document provides a means for keeping the document current with new technology and processes and allowing for internal and external technical reviews.

1E.1.2 Content

This Appendix describes the process for submitting changes to the document. These changes are global in nature and do not address technical changes that are related to specific and unique program issues.

1E.1.3 Applicability

The document change process is applicable to all Range Users and Range organizations that are responsible for applying the document on contract and monitoring the compliance and implementation of the requirements.

1E.2 CHANGE PROCESS

Changes to EWR 127-1 shall be submitted using the Change Request form. Only one change is allowed per Change Request form and that change is required to stand alone regarding specific subject matter and alphanumeric paragraph number. **NOTE:** A sample of this form may be found in the Range Safety Range User Handbook.

1E.2.1 Completing Change Requests

Change Requests shall include the following information:

- a.* Date of request
- b.* Name of originator
- c.* Name of company or agency
- d.* Address of company or agency
- e.* Telephone and Fax numbers as applicable

f. The alphanumeric designation of the affected paragraph

g. The text for the suggested change

h. The rationale for the suggested change

1E.2.2 Submitting Change Requests

Completed Change Requests shall be submitted to the 45 SW/SE Office of the Chief of Safety, Systems Safety Engineering Support, 1201 Minuteman Street, Patrick Air Force Base, Florida 32925-3238.

1E.2.3 Range User Review

Depending upon the impact of a proposed change, Change Requests may be sent out to Range Users for review and comment prior to final resolution.

In addition, if the proposed change is complex, meetings may be arranged with Range Users as required.

1E.2.4 Disposition of Change Requests

a. 45 SW/SE is the office of primary responsibility and 30 SW/SE will be the office of coordinating responsibility for all EWR 127-1 changes.

b. The disposition of Change Requests falls into the following three categories:

- 1.* Concur As Written
- 2.* Concur With The Intent. In such cases, the Change Request will be rewritten.
- 3.* Do Not Concur. Rationale for not accepting the proposed change will be provided.

1E.2.5 Range User Notification

Approved changes to the document shall be published annually. Changes requiring immediate Range User attention shall be published as required as official document Change Notices. A sample Change Notice is included in the Range User Handbook.

APPENDIX 1F

GENERIC PAYLOAD POLICY AND APPROVAL REQUIREMENTS

1F.1 GENERIC PAYLOAD POLICY

The interactive process between Range Safety, payload manufacturers, and launch vehicle companies or government agencies described in this section will ensure minimum impact to payload programs and reduce the cost and time required for the approval process.

Many payload systems are generic, meaning they are built to a common bus structure, using a common launch vehicle, and common Range processing prelaunch and launch procedures. As a result, these generic payloads contain few changes to the baseline system; and the safety data can remain the same from one mission to the next.

To take advantage of previously approved payload systems and generic safety data, the policy described below shall be followed; however, they may be modified to meet individual program requirements:

a. Range Safety and the payload manufacturer in conjunction with the launch vehicle company or government agency shall conduct initial planning meetings to establish a generic payload approval process.

b. Once a baseline system has been approved, Range Safety efforts will focus on specific changes for each new program or mission. **NOTE:** Existing and ongoing previously approved components, systems, and subsystems need not be resubmitted as part of data packages for review and approval.

c. Range Safety, the payload manufacturer, and launch vehicle company, or government agency, shall conduct a safety assessment of each new program or mission to define changes and/or additions that create new, uncontrolled hazards or that increase risks significantly.

d. Based on the joint safety assessment, the parties shall agree on the minimum required documentation to be submitted to Range Safety for review and approval.

e. Data submittal and Range Safety response times shall be established based on the joint safety assessment and modified only upon agreement of all parties.

f. The goal of the generic payload approval process is to achieve final Range Safety approval at least 60 calendar days prior to payload arrival on

the launch complex.

1F.2 APPROVAL PROCESS FOR EXISTING PAYLOAD BUSES

For currently existing payload buses, the goal is to grant baseline approvals for generic buses during the first mission after implementation of this approach. Subsequent flights would use the joint assessment process to review and approve changes to the generic bus and/or payload additions for specific missions. Key to the approach is the safety assessment that is used to determine whether changes or additions have created any new uncontrolled hazards or increased the risks significantly. The assessment results will be utilized to determine data required and review and approval requirements.

The approval process for existing payload buses is shown in Figure 1F-1 and described below:

1F.2.1 Launch Services and Mission Orientation Briefing

a. A launch services and mission orientation safety briefing shall be conducted for Range Safety approximately 45 days after contract award for the mission. The briefing shall cover the following topics:

1. Changes to the launch vehicle
2. Changes to the payload bus
3. Planned payload additions for the mission
4. Changes to hazardous systems and operations (the focus of this review)

b. Range Safety concurrence for both the mission concept and schedule for the remaining Range Safety milestones shall be provided during the mission orientation safety briefing or within 14 calendar days after the briefing.

1F.2.2 Data Review and Approval

1F.2.2.1 Mission Unique Missile System Prelaunch Safety Package

a. A Missile System Prelaunch Safety Package (MSPSP) shall be delivered approximately 12 months prior to launch and contain the data requirements identified during the mission orientation safety briefing on the changes to launch vehicle and payload unique for the mission and identified in the initial operation's concept review.

APPENDIX 1F GENERIC PAYLOAD POLICY AND APPROVAL REQUIREMENTS

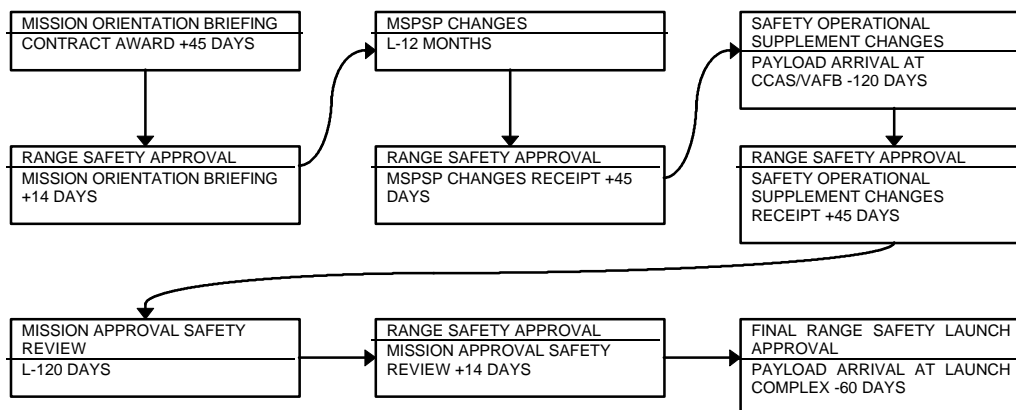


Figure 1F-1
Approval Process for Existing Payload Buses

b. Range Safety shall provide responses 45 calendar days after receipt of the data package.

1F.2.2.2 Ground Operations Plan (GOP) and Hazardous and Safety Critical Procedures

a. A GOP supplement describing changes to approved operations and/or new or modified safety critical or hazardous procedures shall be delivered to Range Safety approximately 120 days prior to payload arrival on the Range. **NOTE:** This supplement is required only if changes have been made to operations and procedures that affect hazardous levels or risks.

b. Range Safety shall provide responses 45 calendar days after receipt of the data.

1F.2.3 Mission Approval Safety Review

a. A mission approval safety review shall be conducted approximately L - 120 days to obtain Range Safety approval for launch vehicle and payload processing, transport to the payload launch pad, payload launch vehicle mating, and launch pad payload processing.

b. Unless there are significant issues, Range Safety shall provide mission safety approval 14 calendar days after the safety review.

1F.2.4 Final Launch Approval

a. Final approval to proceed with launch vehicle and payload processing up to beginning the final countdown shall be provided by Range Safety at least 60 days prior to payload arrival at the launch

complex. **NOTE:** Flight plan approval for a mission that involves public safety may not be granted until just prior to the Launch Readiness Review (LRR) depending on the complexity of the public safety issue encountered. For example, typically, at the ER, easterly launch azimuths can be approved at least 120 days prior to launch; on the other hand, high inclination launches may require extensive risk analyses that can delay final flight plan approval until just prior to the LRR.

1F.3 APPROVAL PROCESS FOR NEW PAYLOAD BUSES

For new payload buses, the goal is to grant baseline approvals for generic buses during the first mission after implementation of this approach. Subsequent flights would use the joint assessment process to review and approve changes to the generic bus and/or payload additions for specific missions. Key to the approach is the safety assessment that is used to determine whether changes or additions have created any new uncontrolled hazards or increased the risks significantly. The assessment results will be used to determine data required and review and approval requirements.

The approval process for new payload buses is shown in Figure 1F-2 and described below:

1F.3.1 Concept Orientation Briefing and Safety Review

a. A concept orientation briefing shall be provided to Range Safety early in (no later than 45

APPENDIX 1F

GENERIC PAYLOAD POLICY AND APPROVAL REQUIREMENTS

days from) the conceptual phase of the development (cDR).

b. The generic approval process shall be documented and concept approvals granted so that an audit trail can be established.

c. A concept orientation safety review shall be held in conjunction with this briefing and approval of design concepts, schedule of safety submittals, and Range Safety responses shall be documented.

d. Range Safety concept approvals not granted at this meeting shall be provided within 14 calendar days.

1F.3.2 Preliminary Design Review

a. A preliminary design review (PDR) shall be held at least 12 months prior to scheduled launch and will to provide necessary MSPSP data for initial Range Safety approval before the final payload design and prelaunch processing is initiated.

b. Range Safety shall provide approvals within 45 calendar days after the meeting.

1F.3.3 Critical Design and Data Review

a. Prior to initiating hardware manufacture, a critical design review (CDR) shall be held to pro-

vide Range Safety the necessary MSPSP data to grant final design approval and prelaunch processing initial procedure review.

b. Range Safety shall provide a response in 45 calendar days after meeting.

c. A Ground Operations Plan describing operations and containing safety critical and hazardous procedures shall be delivered to Range Safety approximately 120 days prior to payload arrival on the Range.

d. Range Safety shall provide responses within 45 calendar days.

1F.3.4 Mission Approval Safety Review

a. A mission approval safety review shall be conducted approximately L - 120 days to obtain Range Safety approval for launch vehicle and payload processing, transport to the payload launch pad, payload launch vehicle mating, and launch pad payload processing.

b. Unless there are significant issues, Range Safety shall provide mission safety approval 14 calendar days after the safety review.

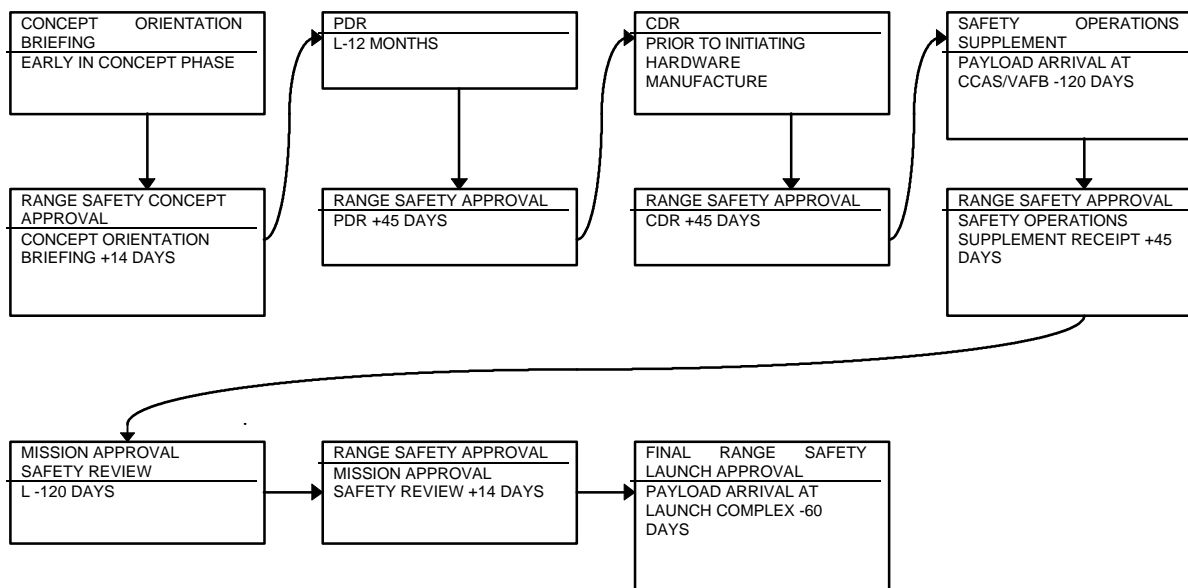


Figure 1F-2
Approval Process for New Payload Buses

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GENERIC PAYLOAD POLICY AND APPROVAL REQUIREMENTS

1F.3.5 Final Launch Approval

Final approval to proceed with launch vehicle and payload processing up to beginning the final countdown shall be provided by Range Safety at least 60 days prior to payload arrival at the launch complex. **NOTE:** Flight plan approval for a mission that involves public safety may not be granted until just prior to the LRR, depending on the complexity of the public safety issue encountered. Typically, easterly launch azimuths can be approved at least 120 days prior to launch. On the other hand, high inclination launches may require extensive risk analyses that can delay final flight

plan approval until just prior to the LRR.

1F.4 INCIDENTAL RANGE SAFETY ISSUES

Incidental Range Safety issues such as component failures, test failures, and the discovery of unforeseen hazards occurring after baseline approvals shall be worked in real time as part of the final approval process for an individual launch. Typically these issues involve the launch vehicle, not the payload.

APPENDIX 1G

LAUNCH COMPLEX SAFETY TRAINING AND CERTIFICATION

1G.1 INTRODUCTION

1G.1.1 Purpose

This appendix provides 45 SW/SE and 30 SW/SE operational safety training and certification requirements for launch complex safety. These requirements shall be used by Range Users who wish to assume control authority for launch complex safety. **NOTE:** These requirements may be jointly tailored by the Range User and Range Safety to meet special or unique program requirements in accordance with Appendix 1A. Minimum standards, roles, and responsibilities for a launch complex safety program are defined in this appendix.

1G.1.2 Applicability

The requirements in this appendix apply to all full-time government tenant organizations, single commercial users, or USAF squadron/detachment commanders who assume control authority and responsibility for hazardous procedures identified by Range Safety as *launch complex safety* operations. Responsibilities and authorities are defined in Chapters 1 and 6 of EWR 127-1.

1G.2 LAUNCH COMPLEX OPERATIONS SAFETY PROGRAM GENERAL REQUIREMENTS

a. The Range User shall establish and maintain a launch complex operations safety program to support efficient and effective achievement of overall operations safety objectives. **NOTE:** The safety training and certification program shall be referred to as the *launch complex operations safety program*.

b. The Range User shall implement the requirements defined in this appendix using a Range User-prepared operations safety training and certification plan.

1G.2.1 Safety Management System

The Range User shall establish a safety management system to implement provisions of this appendix. The launch complex safety control authority shall be responsible for the following:

a. Establishing, controlling, incorporating, directing, and implementing the launch complex

operations safety program policies

b. Establishing internal reporting systems and procedures for investigation and disposition of launch complex safety operations mishaps and incidents, including potentially hazardous conditions not yet involved in a mishap or incident and reporting such matters to Range Safety

c. Reviewing and approving launch complex safety hazardous procedures

1G.2.2 Launch Complex Operations Safety Personnel Responsibilities and Qualifications

1G.2.2.1 Safety Manager

1G.2.2.1.1 Safety Manager Responsibilities.

The Range User shall establish and maintain a launch complex operations safety manager directly responsible to the launch complex safety control authority. At a minimum, the Range User safety manager shall be responsible for the following:

a. Approving all launch complex safety operations analyses, reports, and documentation

b. Approving all launch complex safety hazardous procedures and verifying they comply with OSHA/EPA operation requirements and the requirements of EWR 127-1, particularly those defined in Chapter 6.

1G.2.2.1.2 Safety Manager Qualifications.

The launch complex safety operations safety manager shall have a minimum of 10 years of applicable managerial or supervisory experience including at least seven years experience in three of the four functional areas listed below. A Bachelor of Science in Engineering and a CSP are also required.

a. Large missile, space vehicle, rocket, torpedo, pre-launch, launch, post-launch operations and/or recovery operations

b. System safety hazard analysis and design or research and development testing of ordnance, explosives, other types of munitions, pyrotechnics, cryogenic, toxic/hypergolic propellants, high pressure gases, radioactive materials, or other hazardous systems/components

c. Nuclear safety and/or ionizing/non-ionizing radiation

d. Preparation and/or review and approval of hazardous operating procedures for missile and weapons systems

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LAUNCH COMPLEX SAFETY TRAINING AND CERTIFICATION

1G.2.2.2 Safety Personnel

1G.2.2.2.1 Safety Personnel Responsibilities.

Safety personnel shall be directly responsible to the launch complex safety operations safety manager. At a minimum, Ranger User launch complex safety personnel shall be responsible for the following:

- a. Reviewing launch complex safety operations analyses, reports, and documentation
- b. Performing a detailed safety engineering review of launch complex safety hazardous procedures to ensure compliance with federal, state, local OSHA/EPA operation requirements and the requirements in EWR 127-1, particularly those defined in Chapter 6.
- c. Performing safety, surveillance, and monitoring of all launch complex safety hazardous operations

1G.2.2.2.2 Safety Personnel Qualifications.

Launch complex safety personnel shall meet rigid qualification standards and shall be fully experienced, trained, and certified to perform launch complex safety duties.

- a. All safety personnel shall have at least four years of applicable experience in at least three of the four functional areas identified in 1G.2.2.1.2.
- b. Personnel who provide detailed safety engineer review of launch complex safety analyses, reports, documentation, and hazardous procedures shall have a Bachelor of Science degree in Engineering and a CSP.
- c. The launch complex safety work force shall be composed of the following levels of experience.
NOTE: An Engineering degree may be used to satisfy three years of the required experience, or an equivalent combination of education, experience, and training may be deemed acceptable by 45 SW/SE.

1. At least 30 percent shall have more than eight years of applicable experience in at least three of the four functional areas identified in 1G.2.2.1.2.

2. An additional 50 percent shall have at least six years applicable experience in at least three of the four functional areas identified in 1G.2.2.1.2.

3. An additional 10 percent shall have at least four years applicable experience in at least

three of the four functional areas identified in 1G.2.2.1.2.

4. The remaining 10 percent may be trainees.

1G.2.3 Launch Complex Operations Safety Personnel Training Requirements

The launch complex safety operations safety manager and safety personnel shall have initial and refresher training in the following areas every three years:

- a. Recognition of launch complex safety hazards including:
 1. Overhead and mobile crane and hoists
 2. Sling assemblies
 3. Handling structures
 4. Personnel work platforms
 5. Acoustic hazards
 6. Non-ionizing radiation
 7. Laser systems
 8. Ionizing radiation sources
 9. Hazardous materials
 10. Airborne and ground pressure systems
 11. Airborne and ground cryogenic systems
 12. Airborne and ground hypergolic systems
 13. Airborne and ground ordnance systems
 14. Solid propellants
 15. Airborne and ground electrical and electronic equipment.
 16. Motor vehicles
 17. Forklifts
 18. Computer controlled systems such as cranes and robots
 19. Facilities
- b. Failure modes for launch complex systems including cause and effect
- c. Preventive and control measures for launch complex safety hazards
- d. Safety devices for launch complex systems
- e. Protective equipment
- f. Monitoring and warning devices for launch complexes
- g. Operations hazards analysis techniques
- h. Human engineering principles
- i. Emergency procedures
- j. Hazardous procedures approval and deviation process
- k. Preparation and hazards of hazardous materials

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LAUNCH COMPLEX SAFETY TRAINING AND CERTIFICATION

- l.* Federal (OSHA/EPA), state, local, and Air Force (EWR 127-1, particularly those in Chapter 6) hazardous operations requirements
- m.* Accident investigations
- n.* Non-destructive examination techniques
- o.* Single failure point analysis

1G.2.4 Compliance

Compliance with all launch complex safety operations requirements of federal, state, and local regulations, EWR 127-1 (particularly those defined in Chapter 6) is mandatory. When the Range User launch complex safety operations safety program plan is approved by Range Safety, it provides a basis of understanding between the Range User and Range Safety as to how the launch complex operations safety program will be accomplished.

1G.2.5 Conflicting Requirements

When conflicting requirements or deficiencies are identified in launch complex operations safety program requirements or with other program requirements, the Range User shall submit notification with proposed solutions or alternatives and supporting rationale to Range Safety for resolution.

1G.3 FOUNDATION OF LAUNCH COMPLEX OPERATIONS SAFETY PROGRAM

This section describes the foundation of a launch complex operations safety program. The requirements are as follows:

- a.* Establishing and executing a launch complex operations safety program which meets the tailored requirements of this appendix
- b.* Developing a planned approach for safety task accomplishment, providing qualified people to accomplish the tasks, establishing the authority for implementing the safety tasks through all levels of management, and allocating appropriate resources, both manning and funding, to ensure the safety tasks are completed
- c.* Establishing a launch complex operations safety organization with function and lines of communication within the program organization and with associated organizations (government and contractor)
- d.* Establishing interfaces between launch complex operations safety and other functional elements of the program

e. Designating the organizational unit responsible for executing each safety task

f. Establishing the authority for resolution of identified launch complex operational hazards.

g. Defining launch complex operational safety program milestones and relate these to major program milestones, program element responsibility, and required inputs and outputs.

h. Establishing an incident alert and notification, investigation and reporting process, to include notification of Range Safety.

i. Establishing and executing a launch complex safety operations safety program that complies with the following:

1. Launch complex safety operation requirements in EWR 127-1, particularly those defined in Chapter 6
2. OSHA 1910.119 (c): Employee participation
3. OSHA 1910.119(d)(1)(2): Process safety information
4. OSHA 1910.119(f): Operating procedures
5. OSHA 1910.119(g): Training
6. OSHA 1910.119(h): Contractors
7. OSHA 1910.110(I): Pre-startup safety
8. OSHA 1910.119(j)(2)(3)(4)(5): Mechanical Integrity
9. OSHA 1910.119(k): Hot work permit
10. OSHA 1910.119(l): Management of Change
11. OSHA 1910.119(m): Incident investigation
12. OSHA 1910.119 (n): Emergency planning and response
13. OSHA 1910.119(o): Compliance Audits
14. OSHA 1910.119(p): Trade secrets
15. Air Force Occupational and Environmental Instruction, AFI 91-301

1G.4 LAUNCH COMPLEX OPERATIONS SAFETY PROGRAM PLAN

a. The Range User shall develop a launch complex operations safety program plan (LCOSPP) that describes the tasks and activities of launch complex safety operations safety management and safety personnel required to identify, evaluate, eliminate, and control launch complex operations hazards.

b. The approved plan shall account for all EWR 127-1 (particularly those in Chapter 6) and federal,

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LAUNCH COMPLEX SAFETY TRAINING AND CERTIFICATION

state, and local regulations pertaining to launch complex safety operations on an item-by-item basis.

c. The Range User shall submit a draft LCOSSP to Range Safety for review and approval within 90 days of the date the Range User wishes to assume control authority for launch complex safety operations.

d. The LCOSSP shall include the following sections:

1G.4.1 Launch Complex Operations Safety Organization

The Organization section shall describe the following:

a. The launch complex operations safety organization using charts to show the organizational and functional relationships and lines of communication

b. The organizational relationship between other functional elements having responsibility for tasks with launch complex safety operations impacts and the launch complex operations safety organization

c. Review and approval authority of applicable tasks by launch complex operations safety

d. The responsibility and authority of launch complex operations safety personnel, other Range User organizational elements involved in the system safety effort, contractors, and system safety groups

e. A description of the methods by which safety personnel may raise issues of concern directly to the program manager or the program manager's supervisor within the organization

f. Identification of the organizational unit responsible for performing each task

g. Identification of the authority responsible for resolving launch complex safety operations hazards

h. The staffing of the launch complex operations safety organization for the duration of the program including personnel loading and a summary of the qualifications of safety personnel assigned to the effort, including those who possess coordination and approval authority

i. The process by which Range User management decisions are made, including such decisions as timely notification of unacceptable risks, necessary action, incidents or malfunctions, and waivers to operations safety requirements

j. Details of how resolution and action relative to launch complex operations safety will be accomplished at the program management level possessing resolution authority.

NOTE: See Appendix 1B.1.3.1 for additional guidance.

1G.4.2 Launch Complex Operations Safety Program Milestones

The LCOSSP shall:

a. Provide a program schedule of safety tasks, including start and completion dates, reports, and reviews

b. Identify subsystem, component, and software safety activities as well as integrated system level activities such as design analyses, tests, and demonstrations applicable to the launch complex operations safety program but specified elsewhere to avoid duplication.

NOTE: See Appendix 1B.1.3.2 for additional guidance.

1G.4.3 LCOSSP Data

The LCOSSP shall provide the following data:

a. A list of all analyses, reports, and documentation used by safety personnel to review and approve hazardous launch complex safety procedures and execute the safety program

b. A list of all hazardous procedures categorized as launch complex safety procedures by Range Safety

c. The procedures for accessibility of the data by Range Safety and for retention of the data for historical and legal requirements

1G.4.4 Interfaces

The LCOSSP shall identify the following interfaces in detail:

a. The interface between launch complex operations safety and all other applicable safety disciplines such as nuclear safety, Range Safety, explosive and ordnance safety, chemical and biological safety, and laser safety

b. The interface between launch complex operations safety, systems engineering, systems safety engineering, and all other support disciplines such as maintainability, quality control, reliability, software development, human factors engineering, and medical support (health hazards assessments)

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LAUNCH COMPLEX SAFETY TRAINING AND CERTIFICATION

c. The interface between launch complex operations safety and all system integration and test disciplines

NOTE: See Appendix 1B.1.3.4 for additional guidance.

1G.4.5 Internal Reviews and Audits

The LCOSPP shall describe the procedures for accomplishing the following:

a. Annual review of the launch complex operations safety program to verify compliance, relevancy, adequacy, and ensure documentation is current

b. Launch complex safety management and operational reviews (self-audits) to identify program deficiencies and ensure safety program effectiveness

1G.5 LAUNCH COMPLEX OPERATIONS SAFETY HAZARDS ANALYSIS

The Range User shall perform and document the following safety hazard analyses in accordance with the requirements specified in referenced sections of Appendix 1B:

a. A Launch Complex Safety Operating and Support Hazard Analysis (O&SHA) in accordance with the requirements in Appendix 1B.2.4, Task 4

b. Safety analyses of Engineering Change Proposals (ECPs), Specification Change Notices (SCNs), Software Problem Reports (SPRs), Program or Software Trouble Reports (PTRs, STRs), and requests for EWR 127-1 (Chapter 6) deviation or waiver to determine the launch complex safety impact on the system in accordance with the requirements in Appendix 1B.2.6, Task 6

c. A safety compliance assessment to identify and verify compliance with Air Force, federal, state, local, and industry codes to ensure that the hazardous systems are being operated properly in accordance with the requirements in accordance with Appendix 1B.2.8

1G.6 RANGE SAFETY AUDITS

a. Launch complex safety audits shall be conducted by Range Safety on a periodic basis.

b. The audit shall measure the status of each safety task, interrelationship between safety and other program disciplines, identification and implementation of safety requirements/criteria, and

documented evidence which reflects planned vs. actual safety accomplishment.

c. Each audit shall evaluate program milestones, safety program milestones and incompatibilities that require remedial corrective action.

d. The Range User shall initiate positive corrective actions where deficiencies are revealed by the audits.

e. Components, equipment, conditions, designs, or procedures that provide unusual safety problems, shall be audited.

f. Audits shall include verification or corrective action on problems revealed by previous audits.

g. The Range User shall support these Range Safety audits by providing access to documentation that substantiates compliance with federal, state, local, and EWR 127-1 (particularly Chapter 6) launch complex operations safety requirements.

1G.7 45 SW/30 SW SAFETY PROGRAM APPROVAL

The Range User launch complex operations safety program shall be approved by the 45 SW/CC or 30 SW/CC, as appropriate, once the following tasks have been accomplished:

a. The Range User shall submit a letter to the 45 SW/30 SW Commander stating that they wish to exercise control authority over launch complex safety operations, and the commander has agreed.

b. The Range User shall identify those launch complex safety operations/procedures they wish to have control authority for, and provides this list to Range Safety.

c. Range Safety will identify those operations/procedures that can be classified as launch complex safety operations

d. The Range User and Range Safety will jointly tailor this appendix and Chapter 6 of EWR 127-1.

e. The Range User shall prepare the launch complex operations safety program plan and submit to Range Safety for review and approval.

f. The Range User shall prepare operating hazards analysis (as required) and submit to Range Safety for review and approval.

g. The Range User control authority for launch complex safety shall submit a certification of compliance and substantiating data to Range Safety for review and approval.

APPENDIX 1G

LAUNCH COMPLEX SAFETY TRAINING AND CERTIFICATION

1G.8 SAFETY PROGRAM DECERTIFICATION

a. As appropriate, the Range User launch complex operations safety program can be decertified by the 45 SW/CC or 30 SW/CC for the following reasons:

1. The safety program, as implemented, does

not comply with the Range approved launch complex operations safety program requirements

2. Internal audits or Range Safety of safety program indicate serious deficiencies that are not being corrected in a time frame acceptable to Range Safety

3. Numerous anomalies and/or accidents caused by operational deficiencies in the safety program

b. Possible 45 SW/CC, 30 SW/CC actions following safety program decertification include:

1. Range Safety and its operations safety contractor will assume control of launch complex safety operations

2. Launch complex safety operations will be terminated until the safety program is approved by 45 SW/CC or 30 SW/CC, as appropriate.